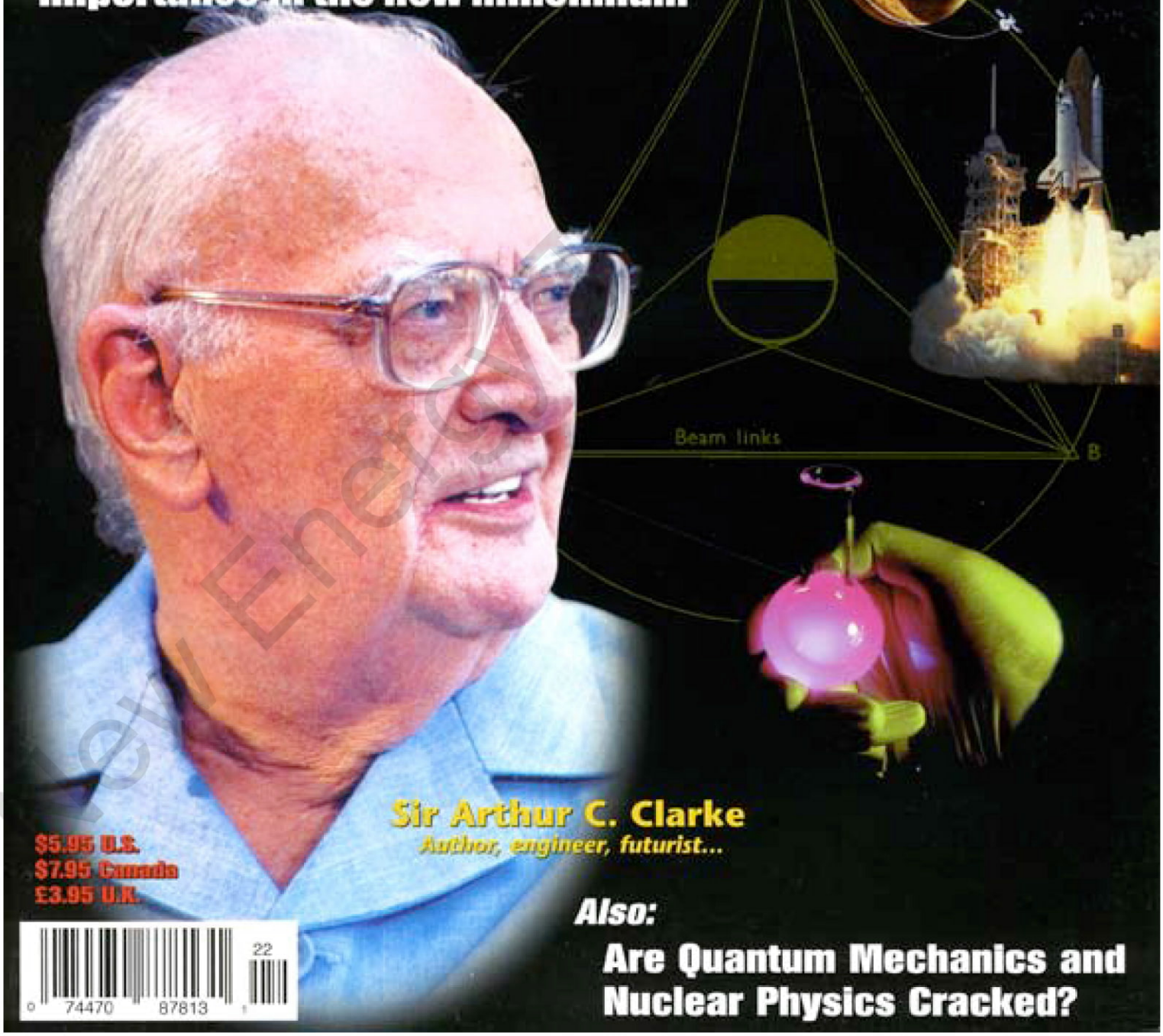
Infinite Energy™

Cold Fusion and New Energy Technology

Volume 4, Issue 22 • 1998

New Energy in 2001:

The technology visionary who "predicted" Cold Fusion in 1963, on its importance in the new millennium



Sir Arthur C. Clarke

Author, engineer, futurist...

$5.95 U.S.
$7.95 Canada
£3.95 U.K.

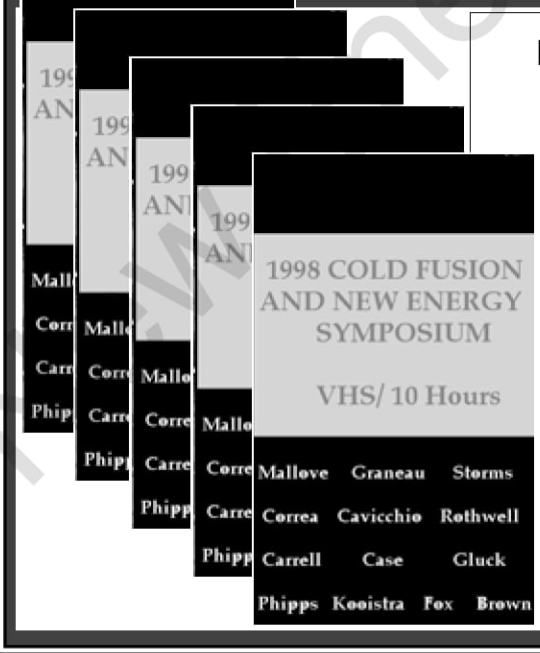
22
0 74470 87813 1

Also:

Are Quantum Mechanics and Nuclear Physics Cracked?

New Energy

COLD FUSION AND NEW ENERGY SYMPOSIUM 1998



If you weren't able to attend on October 11, 1998, ten hours of outstanding New Energy lectures are available on videotape.

No. America: $150.00 Foreign: $175.00

Prices include First Class/Airmail Postage

***Infinite Energy* Magazine**

Cold Fusion Technology, Inc.
P.O. Box 2816
Concord, NH 03302-2816

Phone: 603-228-4516; Fax: 603-224-5975
E-mail: staff@infinite-energy.com
www.infinite-energy.com

Infinite Energy™

Cold Fusion and New Energy Technology

Volume 4, No. 22, October/November, 1998

Editor-in-Chief and Publisher
Eugene F. Mallove, Sc.D.

Managing Editor
Barbara A.F. DelloRusso

Associate Editor
Hal Fox
(Fusion Information Center, Salt Lake City, Utah)

Contributing Editors
Jed Rothwell (Georgia)
770-451-9890
Susan Seddon (UK)
e-mail: sseddon@infinite-energy.com

Information Systems Manager
Jeremy T. Slayton

Publishing Assistant
Christy L. Frazier

Scientific Advisory Board
Dr. Harold Aspden
Southampton, UK
Dr. Robert W. Bass
Pahrump, Nevada
Dr. John O'M. Bockris
Texas A&M University (ret.)
Dr. Dennis Cravens
Cloudcroft, New Mexico
Dr. Peter Glück
Institute of Isotopic and Molecular Technology, Romania
Dr. Xing Zhong Li
Tsinghua University, Beijing, China
Dr. M. Srinivasan
Bhabha Atomic Research Center, India
Dr. Edmund Storms
Los Alamos National Laboratory (ret.)

INFINITE ENERGY Magazine: (ISSN 1081-6372) is published six times a year by Cold Fusion Technology, Inc., P.O. Box 2816, Concord, New Hampshire 03302-2816. Subscription price: $29.95 U.S. and Canada, $49.95 other foreign. POSTMASTER: Send address changes to INFINITE ENERGY, P.O. Box 2816, Concord, NH 03302-2816.

INFINITE ENERGY Magazine
P.O. Box 2816
Concord, NH 03302-2816
Phone: (603) 228-4516
Fax: (603) 224-5975

INTERNET:
subscribe@infinite-energy.com
editor@infinite-energy.com

http://www.infinite-energy.com

PRINTED IN THE USA Copyright © 1998 by Cold Fusion Technology, Inc. All rights reserved.

Table of Contents - Issue 22, October/November, 1998

FEATURES

9 The Man Who "Predicted" Cold Fusion and Modern Alchemy *by Eugene Mallove*
10 *Profiles of the Future* (Arthur C. Clarke) Review *by Jed Rothwell*
15 2001: The Coming Age of Hydrogen Power *by Arthur C. Clarke*
17 Device and Process Testing Updates
18 Cold Fusion and New Energy Symposium 1998, A Brief Report
20 Aqueous Arc Experiment: Results Presentation *by David Marett*
22 The Quirks and Quarks of Physics and Physicists *by Richard H. Wachsman*

TECHNICAL ARTICLES

31 Protocol of Control Experiments for the Plasma-Electrolysis Reactor N3 *by Phylipp M. Kanarev*
33 Physical Laws of the Emerging New Energies as Predicted by Hadronic Mechanics, I: Insufficiencies of Quantum Mechanics *by Ruggero Maria Santilli*
50 Determining Temperature Rise Caused by Heat Sources with Natural Convection Heat Transfer *by Don Slack*
52 Kinetobaric Effect as a Possible Basis for a New Propulsion Principle *by W. Peschka, Translation by Donald Reed*
57 Translator's Analysis and Comments on the Zinsser-Effect Device *by Donald Reed*
60 Force and Gravity *by Frank Znidarsic*

DEPARTMENTS

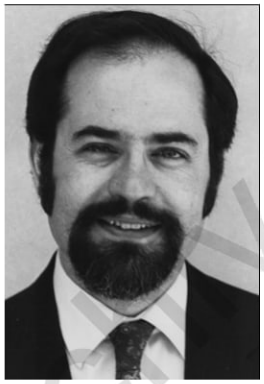
3 Breaking Through—Editorial *by Eugene Mallove*
6 Letters to the Editor
8 Tribute to Chris Tinsley
26 Calendar
29 Briefs • Wired Magazine • Space Technology & Applications International Forum • Breaking Symmetry • 'Whatever happened to. . .?'
63 Cold Fusion Comix
64 Words to Eat
65 Zen and the Art of Debunkery *by Daniel Drasin*
70 Classifieds
71 Highlights from *Infinite Energy* Back Issues
72 *Infinite Energy*—Order Form

About the cover: *(Cover Art: Jeremy Slayton; Photo: Courtesy Arthur C. Clarke)*

New Energy Times Archive

By Eugene F. Mallove, Sc.D.

Profiles of the Future . . .



We are pleased to be able to dedicate both the cover of this issue of *Infinite Energy* and several articles to Sir Arthur C. Clarke. He has been such an incredible inspiration to so many of us in our scientific and technological careers, it is difficult to know where to begin to thank him. And, Sir Arthur has put his reputation on the front line by declaring his support for cold fusion research and development in so many ways—most recently in *Science* magazine (June 5, 1998). He is a dear friend to us all, and a prophet of so much that is good in the world, as humanity extends its reach.

This issue of *IE*, dedicated to his tireless efforts, is but one small step to honor him. Sadly, many of his long-time friends have not paid attention to his calls for bare minimum standards in re-examining the cold fusion evidence. Instead, some of these colleagues, ignorant of what is really going on, have chosen to mock the field (see page 64). Others are just silent and indifferent— inexcusable silence, or is it *fear*? We hope that these friends of Sir Arthur will soon reconsider their positions—and the horrible consequences of indifference or mockery at this fateful hour.

Cold fusion is now at a crucial turning point, as the very welcome November 1998 issue of the influential, high-technology *Wired* magazine suggests in its landmark article by Charles Platt, Dirty Science: The Strange Rebirth of Cold Fusion. See our Briefs section commentary on Platt's article, in this issue of *IE*, page 29.

Platt's incisive 18-page treatment ends with this warning: Even if major funding is obtained for cold fusion, conceivably the phenomenon could suffer from problems as intractable as those of hot fusion. It may never work reliably, or generate enough energy to be commercially viable. One thing, though, is certain: If it remains the poor stepchild of science, starved into obscurity, we'll never have a chance to learn what we may be missing.

Indeed, the reliability of cold fusion processes—both light water, heavy water, and high-temperature gas phase—is a serious issue that has been holding the field back and preventing the rapid introduction of commercial prototype units. The energy density (already several kilowatts per cubic centimeter of active material) is not an issue, we believe, but consistency of operation *is*. Dr. Edmund Storms (Los Alamos National Laboratory, retired) is among the very best authorities on the difficulties of the original Pons-Fleischmann, heavy water-palladium cold fusion approach. He summarized the state of this system in his presentation at the Cold Fusion/New Energy Symposium in New Hampshire (October 11, 1998):

What can I conclude from this experience? First, the phenomenon claimed by Fleischmann and Pons is real, but is only a small part of a much larger picture. The reality of this phenomenon has an even greater importance to science and technology than was originally proposed. Second, the method used by Pons and Fleischmann is useless for the eventual production of commercial power. Active palladium is too difficult to find and the conditions are too sensitive to impurities. Nevertheless, it is a very useful and inexpensive method to explore certain aspects of the phenomena. It is unfortunate that these brave and creative thinkers had to take so much pain and be denied the rewards of their discovery by close-minded colleagues and an incompetent Patent Office. And third, major sources of funding of financial support have dried up, many self-funded individuals are moving on, and conventional rejection has solidified. Those of us who would like to see this field grow are encouraged by a few successes, such as Case, Arata, and Stringham, but even these approaches are woefully underfunded and are being studied by a very small number of individuals.

New approaches are, indeed, required, if the field is to progress. We are very optimistic that several of them could succeed in creating reliable and high power-ratio devices, but these technologies may never come into being (unless we are very lucky), if the field is starved into obscurity, in Platt's words. There is no *if* about it. The field already *is* being starved into obscurity!

Despite starvation (and *ridicule* while we are starving), we carry on—hoping that we will be able to break the horrible Catch-22: Little funding because the irrefutable, commercially available excess energy-producing demonstration unit is not at hand, and not being able to develop that unit because funding is inadequate.

Charles Platt quotes *Infinite Energy* contributing editor Jed Rothwell's assessment of cold fusion's present status: Very little happens. People putter along doing pretty much the same thing year after year. They are old and work slowly, and they have no funding and no equipment—so jobs that ought to take weeks, take years instead. Jed is a hard-nosed realist if ever their was one. He is absolutely right.

Will the immediate future hold more of the same deprivation and inability to move forward boldly? Possibly, but possibly not. The eternal optimist within me does battle daily with the co-existing depressed pessimist, whose alarms are endlessly ratified by external happenings. When I am optimistic, I see the rabbit of success suddenly being yanked out of the hat in some laboratory—either here or elsewhere. When I am pessimistic, I see more of the same roller coaster ride extending into the indefinite future.

At the moment, I see the best hope in the work of Dr. Les Case here in New Hampshire. He has scaled up his attempt at a self-sustaining, heat-producing device that can hold up to a kilogram of palladium-carbon catalyst. For the past two months he has had a small deuterium gas-containing unit continuously operating at 215 ° C, 35° C above the ordinary hydrogen gas baseline temperature produced by an electrical heater consuming identical power. An analysis in this experiment by thermal heat transfer expert Don Slack (page 50) suggests that this kind of temperature anomaly cannot be explained by any vagary of the difference in heat transfer between hydrogen gas and deuterium.

The other good news about this system is that it has attracted the attention of the expert group at SRI International, Dr. Michael McKubre's group. They are working on it right now, and have apparently attracted some funding from a branch of the U.S. military research community. At ICCF-7 in Vancouver last April, McKubre was already bullish

Editorial continued on page 5

New Energy Times Archive

Revealed to the World...

Now...At Your Own University or Corporate Laboratory, Test the Low-Energy Transmutation Process for Remediating Radioactivity* in Natural Thorium — and Other Elements

*Radioactive Elements are converted to stable elements within hours, a process that takes Nature billions of years

The Cincinnati Group

is pleased to make available to scientists and engineers

A Low-Energy Nuclear Transmutation KIT— LENT™

Now taking orders for immediate delivery

U.S. and Foreign Patents Pending

The Radioactivity Remediation Kit, *LENT-1*, includes:

- Specially-Machined, Closed-Cell, Zirconium Electrolytic Chamber
- Full instructions for operation and evaluation of test results
- Technical Assistance

OPTIONAL EQUIPMENT

- Power Supply
- RM-60 Radiation Detector and Software for PC Data Collection

Guarantee:

This kit will produce verifiable Transmutations at Low Energy or Your Money Back

• Safety-Checked at Qualified Laboratories for the Absence of Hazardous Radiation—Process is Aneutronic

For price information, ordering, and kit availability, please contact:

The Cincinnati Group

9772 Princeton-Glendale Road., Cincinnati, OH 45246

Phone: 513-874-4943

http://web.gcis.net/cincygrp

New Energy Times Archive

Editorial continued from page 3

about Case's device. Then came the work of Russ George (now at Saturna Technologies, Inc.), who used the SRI mass spectrometer on-line to determine that helium-4 was building up with time in an apparently excess energy-producing Case catalytic fusion replication that he constructed. The helium built up to over 10 ppm, twice atmospheric level, essentially ruling out contamination as an issue. No helium built up in an ordinary hydrogen gas blank cell that ran in parallel. As we went to press, Russ George was about to go to Pacific Northwest National Laboratory in Richland, Washington to have his replication of Case's work duplicated and verified by an independent team.

Despite setbacks in the evaluation of the Ohmori-Mizuno approach to cold fusion which first appeared in *IE* #20 (see David Marett's article in the present issue, p. 20), we also have Dr. Mizuno's detailed report that the Marett approach is not a valid replication of their work. Also, we have the encouraging report from Dr. Phyllip Kanarev in Russia (page 31) that his molybdenum cathode, titanium anode plasma-electrolysis device with flowing electrolyte has been validated by independent testers. This plasma-electrolysis is certainly a very appropriate term for the whole class of experiments, such as Ohmori-Mizuno and AquaFuel™ or Carbo-Hydrogen™ gas, that employ either underwater arcs or plasma sheaths around metal electrodes. How these systems should be evaluated in their energy balance is presently an evolving science. These are very violent reactions with more complex energy bookkeeping than may be apparent at first glance.

So, which profile of the future to imagine? The one in which cold fusion is starved into obscurity and dumped down one of history's many black holes, or will it be the one in which the rag-tag cold fusion underground gets its hands on the ultimate guerrilla weapon: the irrefutable demonstration device that begins circulating and overcomes all opposition?

Time is not necessarily on cold fusion's side. The tenth anniversary of the cold fusion announcement is fast approaching, March 23, 1999. Will it be a grand victory celebration, or an occasion for more mockery by ignorant journalists and recriminations within the field? We hope for the former, but we have been conditioned to expect the latter. Perhaps like the Eveready Battery Bunny in the famous TV ad we can go on and on and on banging our drums, but it would be so much better if these drums and cymbals were powered by working cold fusion reactors in hundreds or thousands of

Editorial continued on page 7

Infinite Energy Solicits Your Manuscripts Dealing with:

- Experimental Results in Cold Fusion and New Energy
- Theoretical Ideas
- Book Reviews, Opinions

Submit to: Dr. Eugene Mallove
Infinite Energy Magazine
P.O. Box 2816
Concord, NH 03302-2816

If possible, please send double-spaced hard copy, disk, and original hard copy of figures. Software programs used to create equations should *only* be used for extensive equations separated from text. Microsoft Word preferred. Please indicate what version software, platform and whether it has been processed on a MAC or PC. If you have questions regarding format or if you want to send paper by e-mail, please contact:
Barbara DelloRusso, Managing Editor
staff@infinite-energy.com

Institute for New Energy
is an international organization to promote new and renewable energy sources. Its monthly newsletter is

New Energy News,
reporting worldwide on all facets of new and enhanced energy. Memberships in

INE are $35 per year for individual, $60 for corporations & libraries, and includes 12 issues of *NEN*

Journal of New Energy,
a Quarterly Scientific Journal
Hal Fox, Editor
Subscriptions are $150 for 4 issues.

Fusion Information Center
3084 East 3300 South
Salt Lake City, UT 84109

Also available, *Cold Fusion Impact in the Enhanced Energy Age*, a book about the near future of the world energy situation.

Phone for information: 801-466-8680

ENECO

ENECO is in the business of commercializing the exciting new field of low energy induced nuclear reactions in solids.

ENECO

University of Utah Research Park, 391-B Chipeta Way, Salt Lake City, Utah 84108 USA

Ph (801) 583-2000 Fx (801) 583-6245 jaeger@ENECO-USA.com

New Energy Times Archive

LETTERS TO THE EDITOR

To the Editor:

I know that you know about the Union of Concerned Scientists, but thought you might appreciate knowing that I know too and have let them know that I know! See the enclosed.

Fritz H. Mishler
Willamina, OR

Dear Howard Ris—Union of Concerned Scientists:

Have just received your second letter of appeal for helping with the global warming problem.

In April of 1997, as a result of my concern about this problem, I was put in touch with one of your people, by the name of Paul Jefferiss. After some correspondence, he turned me over to David Lockbaum in your Washington, D.C. office. After some correspondence with him and a number of phone conversations over a period of a year or so, I came to the conclusion that your union is not for real. So, instead of sending you any more money, I'm sending you this letter with which to suggest you "Get Real."

By this I mean that, as far as I am concerned, as long as you ignore and/or dismiss the "new energy" phenomena being reported on regularly by publications like *New Energy News* and *Infinite Energy*, your "union of concerned scientists" are a part of the problem. When you "get real," let me know and I will send you money!

Fritz H. Mishler

•—•—•

To the Editor:

I wish to thank Scott A. Thaller for his letter in Vol. 4, No. 21 of *Infinite Energy*. I appreciate his comments on my article, "The Possible Source of Energy for Anomalous Effects" in Issue 17, page 79.

Mr. Thaller found my theory of production of hydrogen from vacuum convincing, but rejects my suggestion of an ether made up of protons and electrons. He points to a theory that the universe was created from quantum particle pair fluctuations and indicates this would lead to matter and anti-matter symmetry.

I suspect we have a lot to learn before we can make a reasonable guess as to the mechanism of the creation of the universe.

My other articles in Issue 17, "Hydrogen from Vacuum," "A Brief History of the Ether" and "Time Mass and Velocity" (Pages 80-85) tried to demonstrate that: 1) Hydrogen has been created in and from vacuum; 2) A concentrated matrix of protons and electrons conforms with ether concepts of the great scientists of previous generations and 3) Many physical phenomena can be readily explained if one assumes the existence of such a matrix.

Instead of trying to explain the creation of the universe, shouldn't we, first, understand the mechanism for attraction and repulsion between magnets we hold in our hands? Shouldn't we wonder how a vacuum can have a definite dielectric constant and a definite magnetic permeability as required by Maxwell's equations? By assuming a concentrated matrix of unpaired protons and electrons, we can easily explain these and many other observed phenomena.

Again, I greatly appreciate Scott Thaller's reading and commenting on my article, but I won't be constrained by someone's theory of creation.

Very truly yours,
Paul E. Rowe

P.S. I found your report on the "Ohmori-Mizuno Effect" (Issue 20) extremely interesting and have performed some preliminary experiments. I will let you know if I come up with anything definite.

•—•—•

To the Editor:

I first became aware of Bessler's wheel back about 1965 and through the years following pieced together the several accounts; I was convinced of his sincerity and of the thoroughness of the examinations of the wheels by the scientists of his time. In 1987, I produced "Perpetual Motion Mystery: A Continuing Quest" and included a large section supporting the genuineness of Orffyreus' wheel. Professors Gravesande and Leibniz and Leibniz's student, Christian Wolff, gave moral support to the further development of the wheel as a power source. Gravesande and Wolff both concluded that a perpetual motion machine was most likely for those devices whose principle of movement depends on impact or collision of the parts within; this because about eight impacts were heard against the descending rim of the wheel during each rotation.

Gravesande's close examination caused him to finally conclude, with all due modesty, that the laws of nature were not well-enough known to generally conclude that a perpetual motion is contrary to those laws. Bessler's only meager description stated that his machine was powered by "swinging weights" continually maintained in a state of disequilibrium which resulted in wheel rotation. Both John Collins and myself interpret this to mean gravity-powered. This being so, Bessler's wheel was no different than an overshot water wheel. Therefore, the principle of the conservation of forces or energy need not be invoked—the external source of energy needed to do work was gravity.

As I pointed out in my book's introduction, there are two distinct definitions for perpetual motion. The original and general definition, found in the Oxford English dictionary includes a "Machine which being once set in motion, should go forever, or until stopped by some external force or the wearing out of the machine." Note that there is no mention of energy input or a conservation principle. Whereas the much later American definition in Webster's dictionary narrows the scope by invoking the conservation of energy principle. So, gravity-powered wheels are acceptable by the English definition but excluded by the narrowed American definition.

The choice of definition is still now left both to the inventor and the theoretician and is still now worthy of investigation.

R.A. Ford
Simplified Technology Service

•—•—•

••SPECIAL NOTICE••

IF YOUR SUBSCRIPTION BEGAN WITH ISSUE #17 *AND YOU HAVE NOT YET RENEWED*, THIS (Issue #22) IS YOUR LAST ISSUE of *INFINITE ENERGY!!!*.

DON'T DELAY—RENEW YOUR SUBSCRIPTION *NOW!*

ENJOY ANOTHER YEAR (SIX MORE ISSUES) AT THE SAME LOW PRICE...STILL *ONLY*... $29.95 NORTH AMERICA $49.95 FOREIGN

See page 72 for renewal information

New Energy Times Archive

To the Editor:

I've procrastinated long enough. I really enjoy your magazine; it's a breath of fresh air, makes you think and shows all the hard work and professionalism that you put into it.

One can only take so many sound bites and media hype. It's kind of funny that "the truth is out there" came from the tube.

So sign me up for two more years - check enclosed. I think Dr. Randell Mills is on one of the right tracks. He's on to something that will "rock our world" and the theory, simplicity and all came from the same sun that the Egyptians revered as the key element of their religion.

I know you will keep up the good work. As your subscriptions grow, consider lifetime subscriptions like *Mother Earth News* did in the 1970's to help them with their costs.

Richard Yobak
Pine, CO

•—•—•

The following are comments from our online guest book and www information site.
http://www.infinite-energy.com

"I would like to commend those who made impressive improvements to the presentation of your website. This site looks professional and is structured well for a layperson. . . Thank you for your continuing pursuit of the presentation, development and application of earth-impacting technologies." Christopher Holloman

‹‹‹›››

"I have seen some sites that say cold fusion isn't possible, but people generally say that about anything scientifically significant to the welfare of our planet. If scientists were not around, we would still be in the stone age." Michael Smith

‹‹‹›››

"Make some of the papers available online. Add a research forum for interested parties to interact on various topics. Give online tutorials for those who don't know these areas or want to know more." Robert Neil

‹‹‹›››

"I think that the realistic approach you present is likable...Steven Greer and Brian O'Leary are important and I like very much Richard Hoagland's valiant attempts to make dramatic breaks. I don't know why Valerie Hunt doesn't have a website, but maybe I just don't know how to find her. Gene Mallove and those people are the most important people alive right now, I believe. This is an hour that places us on the verge of civil war against the controllers of technology. I believe that it would be best to put the ideas on the net so everyone can build energy devices as soon as possible. I think everyone should give up on the idea of making money on free energy devices. This is not a money maker, except at the manufacturer's level."

John C. Durham

‹‹‹›››

"Since March 1989, I have read with great interest that different groups have developed various devices (*e.g.* CETI, Cincinnati Group, etc.) which either produce excess energy or create anomalous nuclear effects at low temperature. Some of these devices have developed further than others, most notably Blacklight Power Co. and CETI. Could *IE* do more by way of follow-up on the working devices? For example, I recall CETI made 'kits' available to anyone who wanted to purchase them. Who has purchased them? Have any kits been given to independent universities or private labs (other than Dr. George Miley or Dr. Bowles) to confirm the spectacular results? Perhaps this has occurred and the positive results are kept quiet for commercial reasons. It is incredible that such developments avoid disclosure and that establishment 'science' can continue to ignore the results when a device like CETI's is readily available... I continue to be excited about the prospect of a completely unanticipated development in physics/chemistry. Like most of your readers, I am confident we are in the middle of just such an upheaval in science/technology. I am extremely grateful to you for your hard work in creating and continuing *Infinite Energy* magazine."

Albert Joseph

CORRECTION FROM ISSUE #21

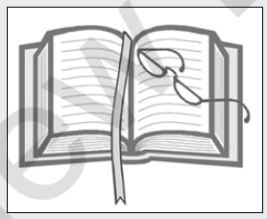
David Samuel is President of Nuclear Solutions, not Dr. Paul Brown as indicated on the cover. Brown is Vice-President.

Editorial continued from page 5

labs. Sir Arthur hopes that all the hand waving will soon come to an end and that we will all be able to celebrate the optimistic *Profile of the Future* for which we hunger. Let's win this one for the man who really did predict cold fusion and the age of modern alchemy (see page 9). Sir Arthur deserves at least this much as he navigates his ninth amazing decade, onward to 2001 and beyond.

"Those that flatly refuse to seek the truth, but yet regard themselves as innovative free-thinkers. . ."
—Francis Bacon

Advancement of Learning, 1605



Why not give *Infinite Energy* as a Gift Subscription to a friend or to your local library?

NEW WATERPOWER TECHNOLOGY FOR THE 21st CENTURY IS AVAILABLE NOW!

Water placed in steel pipe containers store large amounts of elastic compression energy. With ***SUPER FAST JET VALVES,*** invented, made and tested in Pilot Plant conditions by International Molecular Reactor Power Co., Inc., the stored energy is discharged in the form of High Velocity Jets driving a special impulse turbine and electric generator. The velocity of the intermittent jets, developed by the fall *and* expansion of the water compressed by its own weight and water hammer effect, imparts kinetic energy to the turbine capable of generating considerably more power, by far, than the power required to pump back-up the water at "mgh" height. The Molecular Reactor also lets gravity *renew* the stored energy in fractions of a second, between two jets. **This is the most economical, safest and cleanest *RENEWABLE energy* known to man.**

If you are interested in participating in the construction of the Pilot Plant as one of the 50 charter partners or to share the benefits of the most advanced clean power generation technology, please contact:

Nicolas Pataceano, President, International Molecular Reactor Technology Co., Inc.
Tel: (705)431-1940, Fax: (705)431-7849, E-Mail: nicpat@bconnex.net

▼▲▼

New Energy Times Archive

TRIBUTE TO CHRIS TINSLEY

Introduction by Eugene Mallove

This is the anniversary year of the death of *Infinite Energy* co-founder and Contributing Editor Christopher P. Tinsley. On October 1, 1997 our beloved Chris, dear friend and scientific colleague, died unexpectedly at his home in Nottingham, England. Immediately there followed an outpouring of tributes from those many who had known his talent for incisive technical assessment of putative over-unity devices, his good natured and humorous challenges to the cold fusion skeptics, and his skill in conducting brilliant experiments on a shoe-string budget. (His bio and these many kind tributes were published in *IE* Nos. 15&16.) We were all profoundly shocked at his death, which has been a continuing great loss to us all.

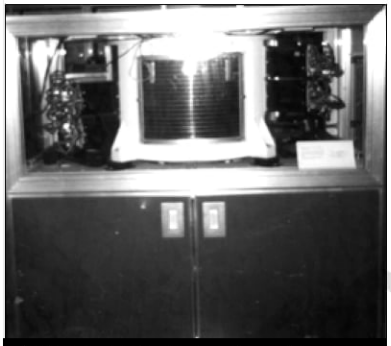
Chris was a superb electrical engineer who had worked in the early days of computer technology as it was developing in England. He was especially proud that his handiwork had gone into one of the earliest of disc-drive assemblies, the "KDF-9." The very device that he had a hand in producing wound up on display in the London Science Museum! Our present UK Contributing Editor Soo Seddon, Chris's financeé at the time of his death, has created this touching tribute to Chris.

REMEMBRANCE OF TINSLEY'S PAST
by Soo Seddon

"To err is human, to really foul things up requires a computer."

That, penned by Chris Tinsley's favorite author - Anon. - is one that he always disputed. To really foul up a computer, he reckoned, a human was absolutely essential. This certainly proved to be the case when he worked on the KDF-9, an early prototype data storage system. (The actual device he worked on, which was originally installed in the National Physical Laboratory, is now on display in the London Science Museum).

He told me how colleagues and himself had spent all day working out the "rats nest" of wiring at the back of the KDF-9, carefully determining where each of the many dozens of tiny colored wires required to be fixed and had temporarily stretched them out and clipped them onto a bench a few feet away. Just as they were preparing to leave for the evening, in marched the cleaning lady dragging her heavy-duty vacuum cleaner behind her. She marched resolutely towards the power point on the bench, where the array of lightly secured wiring lay exposed and vulnerable. He recalls opening his mouth to yell a warning - in fact several of his colleagues did the same, but strangely no sound came from any of them.



KDF-9 in the London Science Museum. Photos: Courtesy Soo Seddon

They could only watch in silent horror, in what he swore was slow motion, as the abruptly disconnected wiring snaked through the air. There was a communal groan as they glared at their cleaning lady who, quite undaunted, proceeded to vacuum the floor muttering vaguely about how "someone could have tripped over all those messy wires."

There were, it seemed, many traumas suffered by R&D workers in the dawn of the computer age. Like having to write programs in short sections with a RAM buffer area equivalent to the "size of a postage stamp;" and how it verged on ecstasy when he eventually had a gigantic 64k to work with; also having to share an office with the formidable" lady programmers" who came to work on men's bicycles, wore long tweedy skirts, sensible shoes, faux pearls and pouted a lot over lengthy print-outs.

I often wonder whether he would have worked on computers at all had he not abruptly left Cambridge following a major row with a mad Prof. who

Tinsley continued on page 69

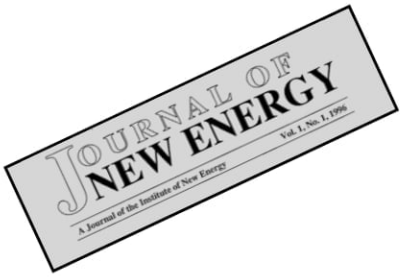
FUTURE TECHNOLOGY INTELLIGENCE REPORT

FTIR is an 8 page monthly newsletter devoted to technical predictions

Founded 1990
Editor: Antony C. Sutton, D.Sc.
Author *The View From 4-Space*

FTIR reports on:
- All over unity technologies
- Political, economic and business aspects of over unity
- Biological and chemical low energy transmutation
- Etheric weather engineering and "cloudbusters"
- Energy medicine
- Remote viewing
- Alien extra terrestrial technology

Subscription: $65.00 per year (12 issues) payable to:
Sutton
P.O. Box 2903A
Sacramento, CA 95812-2903



Published by the

Fusion Information Center
3084 East 3300 South
Salt Lake City, UT 84109

A Quarterly Journal
Hal Fox, Editor

Subscription:
$150 for 4 issues
Single Issues: $45

CALL 603-228-4516
FOR *IE'S* MEDIA KIT

New Energy Times Archive

Arthur C. Clarke:

The Man Who "Predicted" Cold Fusion and Modern Alchemy

Compiled by Eugene Mallove

"To predict the future we need logic, but we also need faith and imagination, which can sometimes defy logic itself."

—Arthur C. Clarke, *Profiles of the Future*

Arthur C. Clarke might not remember that he really did "predict" cold fusion, so successful have been his many other predictions of technological and scientific breakthroughs—notably many milestones in spaceflight, including his own invention (in 1945!) of the geosynchronous communications satellite. Yet there it is in my well-worn 1964 Bantam Books edition of Clarke's *Profiles of the Future*.

It appears on many pages, but its most startling form is on page 153: "We must remember, however, that nuclear engineering is in roughly the same position as chemical engineering at the beginning of the nineteenth century, when the laws governing reactions between compounds were just beginning to be understood. We now synthesize, on the largest scale, drugs and plastics which yesterday's chemists could not even have produced in their laboratories. Within a few generations, we will surely be able to do the same thing with the elements." Sorry, Arthur, you were a few generations too conservative—we'll forgive you for that! The catalytic transmutations that you predicted are occurring, in their most primitive forms, in cold fusion cells today.

Following this description in *Profiles*, Clarke describes the conventionally understood catalytic nuclear reactions that occur in the Sun, which convert ordinary hydrogen to helium—the first steps in what he says "might be christened 'nuclear chemistry.'" He continues: "But there are other ways of starting reactions, besides heat and pressure. The chemists have known this for years; they employ catalysts which speed up reactions or make them take place at far lower temperatures than they would otherwise do...Are there nuclear, as well as chemical, catalysts? Yes, in the Sun, carbon and nitrogen play this role. There may be many other nuclear catalysts, not necessarily elements. Among the legions of misnamed fundamental particles which now perplex the physicist—the mesons and positrons and neutrinos—there may be entities that can bring about fusion at temperatures and pressures that we can handle. Or there may be completely different ways of achieving nuclear synthesis, as unthinkable today as was the uranium reactor only thirty years ago. The seas of this planet contain 100,000,000,000,000,000 tons of hydrogen and 20,000,000,000,000 tons of deuterium. Soon we will learn to use these simplest of all atoms to yield unlimited power. Later—perhaps very much later—we will take the next step, and pile our nuclear building blocks on top of each other to create any element we please."

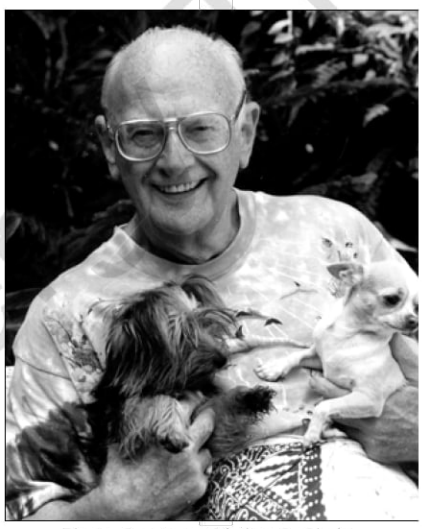


Photo: Courtesy of Arthur C. Clarke.

Well, we can't have expected Arthur to have predicted that palladium, much less ordinary nickel, would be the initiating catalysts of the cold fusion-transmutation revolution, but they are. He was thinking of exotic catalytic nuclear particles. Yet he did allow that there could be "unthinkable," "completely different ways" of achieving nuclear synthesis.

It is interesting that on his chart of "The Future," on the very last page of *Profiles*, under "Physics," Clarke places the invention of "nuclear catalysts" somewhere between the years 2020 and 2030. (This is on page "235" no less, for those who are fond of numerological coincidences.) Under the "Materials and Manufacturing" column he has "Fusion power," meaning *hot* fusion, of course. Well, hot fusion didn't come in 1990 and will probably never come, because it will not be needed, but then again—a nice coincidence—1990 is just about 1989, the year of Cold Fusion Day, March 23.

Arthur may well have predicted even the *critics* of cold fusion. Concluding these nuclear catalyst passages, he writes: "In this inconceivably enormous universe, we can never run out of energy or matter. But we can easily run out of brains."

On page 19 of *Profiles*, Clarke writes: "...even when the existence of atomic energy was fully appreciated—say right up to 1940—almost all scientists would have laughed at the idea of liberating it by bringing pieces of metal together. Those who believed that the energy of the nucleus ever could be released almost certainly pictured complicated electrical devices—'atom smashers' and so forth doing the job. (In the long run, this will probably be the case; it seems that we will need such machines to fuse hydrogen nuclei on the industrial scale. But once again, who knows?)" There again is Clarke's openness to great possibilities—doubting the notion that a simple fusion reactor could be developed, but holding open the *possibility*. "Who knows?", indeed! Barely a quarter of a century after these lines were penned came Fleischmann and Pons.

On page 143 comes an oblique version of the cold fusion prediction: "Perhaps the forced draft of space technology will lead us fairly quickly to a lightweight power cell, holding as much energy per pound as gasoline; when we consider some of the other marvels of modern technology, it seems a modest enough demand." That remark was in the context of energy storage, not power generation. Furthermore, cold fusion cells will have enormously greater energy storage density than gasoline. Even Dr. Randell Mills' "superchemistry" explanation of cold fusion excess energy has a 200 HP automobile going 100,000 miles on a tankful of ordinary water (see *Infinite Energy*, No. 17).

Even a remarkable technological seer, such as Clarke, can sometimes fall short and pen remarks that contradict his more penetrating visions. He also writes (page 143): "It may well be—indeed, at the moment it appears very likely—that fusion plants can be built only in very large sizes, so that no more than a handful would be required to run an entire country. That they can be made small and portable—so that they could be used to drive vehicles, for example, appears most improbable. Their main function will be to produce huge quantities of thermal and electrical energy, and we will still be faced with the problem of getting this energy to the millions of places where it is needed."

Alas, no one is perfect, but Arthur C. Clarke had nearly perfectly clear vision of how to go about the business of technology prediction—as Jed Rothwell recounts in his more encompassing review of *Profiles of the Future*.

New Energy Times Archive

Review of Arthur C. Clarke's
Profiles of the Future: An Inquiry into the Limits of the Possible
By Jed Rothwell

How did Arthur C. Clarke come to believe that cold fusion is real, and why should anyone care? The answer can be found in an unforgettable nonfiction book he wrote in 1963. It is *Profiles of the Future*, one of the best books about the future ever written, and one of the finest short overviews of science and technology. Most readers know Clarke as a science fiction writer and the screenwriter of the acclaimed movie *2001: A Space Odyssey*. A mere science fiction writer might not be considered sufficiently qualified to judge the evidence for cold fusion. In the pages of this book, you meet Clarke anew as a scientist, historian and teacher. Those who, after reading this book, still doubt his qualifications for doing rigorous science should review his famous pioneering papers on geostationary satellites in *Wireless World* (1945) and *Spaceflight* (written May 1945, published in 1968).

I absorbed hundreds of lessons from this book which I take for granted: that mankind will eventually colonize the planets and stars; that computers will learn to think; that automobiles are absurdly dangerous and inefficient; and that any sufficiently advanced technology is indistinguishable from magic (Clarke's third law). Take automobiles: When I was growing up in the 1960s, widespread protests against air pollution and destructive highway construction were just beginning. I empathized with the environmental movement, but I felt a gnawing sense of helplessness, because I knew that our economy depended upon the automobile, people would starve without it, and Americans love automobiles. I could not imagine how we might escape this predicament. Then I chanced upon this book, and discovered an author who despised automobiles as much as I did, and who also understood how necessary they were. Imagine reading this at the height of postwar enthusiasm for highways and automobiles:

> The automobile is so much a part of our existence that it seems hard to believe that it is a child of our century.
>
> Looked at dispassionately, it is an incredible device, which no sane society would tolerate. If anyone before 1900 could have seen the approaches to a modern city on a Monday morning or a Friday evening, he might have imagined that he was in hell—and he would not be far wrong.
>
> Here we have . . . millions of vehicles . . . hurtling in all directions under the impulse of anything up to two hundred horsepower. . . . In a lifetime they have consumed more irreplaceable fuel than has been used in the whole previous history of mankind. The roads to support them, inadequate as they are, cost as much as a small war; the analogy is a good one, for the casualties are on the same scale.
>
> Yet despite the appalling expense in spiritual as well as material values (look what Detroit has done to esthetics) our civilization would not survive for ten minutes without the automobile.

Where I saw no way to escape the culture of the automobile, Clarke described many ways in which we can improve automobiles, and even reduce or eliminate the need for them. He did not propose drastic or utopian schemes. He proposed engineering solutions coupled with political, economic and social reform. We can fix the problem and make life more convenient at the same time with innovations like telecommuting, computerized automobiles, and fusion energy. It will cost a lot of money, but not as much as letting the problem fester.

Clarke is not foolishly optimistic. He warns that we might be too stupid or stubborn to fix our problems. He warns that the solution will take as much hard work as building the highways did in the first place. He is not enamored of technology for its own sake; he warns of the horrors of the atom bomb, pollution, and technology run amuck. Clarke's message is that nature provides the means, and if we have intelligence and gumption we can deal with our problems. History since 1963 has proved him right. We reduced pollution and trimmed the population explosion. We have learned that it is not necessary to wipe out other species for us to live, and on the other hand we do not have to drastically limit people's freedom to preserve nature. We do not have to condemn the Chinese to a lifestyle less opulent than our own. That is a good thing, too, because the Chinese would not put up with it, and we could not restrain them even if we wanted to.

A person can learn more from this slim volume than from a semester of college, and the lessons will last a lifetime: several lifetimes, probably. Most books about the future seem dated after a few years. This one will still be a source of revelations, lessons and a guide to the unfinished business of mankind four centuries from now, like Francis Bacon's *Novum Organum*, which was published in 1620 and which ought to be required reading for scientists today. Bacon prophesied the scientific revolution. Clarke foretells the ultimate effect that revolution will have on society. From Clarke's long view of history the revolution has just begun. It has barely touched the lives of most people on earth, who still lack basic medicine, transportation and communications. The industrial revolution has produced many marvels and many horrors too, but it is only the prelude to a much longer, richer, and more challenging revolution that will continue for thousands of years. It will open interplanetary space and finally interstellar space for exploration and colonization, and give us godlike power for good or evil.

New Energy Archive

I do not know another book like *Profiles.* Strategic studies by research organizations and books about the near future of computers, like Bill Gates' *The Road Ahead* (1995), describe only an acre where Clarke maps out a continent. They lack Clarke's magic, his imagination, humor and sense of awe. A book like *Future Shock* (1970) does not compare. Toffler does not have Clarke's imagination or technical training, and his knowledge of society, language, anthropology and literature are shallow. I recall a passage from *Future Shock* that led me to dismiss the book and its author. It was something to the effect that in the future we will be free to choose our own culture. For example, he said, an airline can offer a selection of cultures by decking out stewardesses in western uniforms or kimono and offering different meal plans. The statement rubbed me the wrong way because I read it while I was struggling to learn Japanese. Michio Kaku's recent book *Visions* (1997) is insipid compared to *Profiles.* On one hand it covers far-out, speculative possibilities like antimatter rockets, which he predicts we may have in 2050. On the other hand he describes trivial innovations like "shoes that think." These would allow executives to trade computer data by shaking hands, "because skin is salty and conducts electricity, a resumé can travel electrically from shoe to hands and then to one's acquaintance's hand and shoe." This frivolous gadget would have no impact on people's lives. It would not contribute towards the worldwide provision of food, medicine, energy or education. Clarke concentrates on things that matter. Today's scientists and futurists have a constricted horizon. As Clarke says, the future is not what it used to be.

Clarke's genius is in telling us what we already know, or ought to know. He brings out the profundity in common sense observations and lets us see the world anew. Here is a banal thought that must occur to anyone by age nine: Suppose you had a time machine and you could bring a genius like Archimedes or Leonardo da Vinci into the present. You might show him a diesel engine, an automobile, or a helicopter. He would be astounded by our modern materials, but he would understand the physical principles which made such devices work. "Leonardo, in fact, would recognize several [designs] from his notebooks," Clarke comments. Now suppose you showed him "a television set, an electronic computer, a nuclear reactor, a radar installation." He would be utterly baffled. No ancient genius, even the most farsighted, could have predicted them. Some of these breakthroughs could not have been predicted ten years before they were made. They are radically different from all that has gone before, which makes them effectively "indistinguishable from magic." Clarke describes how Leonardo might devise a manually operated long distance black-and-white television. He might have used a camera obscura to project the image onto a 500 x 500 grid, and semaphores. With 80 assistants, he could send one frame per day, whereas an electronic television does this task thirty times a second. Leonardo was "perhaps the most farseeing man who ever lived" but he would have found this "an absolute and unquestionable impossibility." That may seem obvious, but when Clarke explains it in a few pages, you begin to think of television with the sense of awe Leonardo would feel.

It is distressing how few people understand how television works and why it is so amazing. Many have no idea how the cathode ray tube deflects a beam of electrons. The average person knows so little about the inner workings, television might as well be magic to him, yet he derives no appropriate sense of awe from that magic. Clarke wants to remove the mystery from technology while he restores the sense of wonder people felt when the machines were first invented, and the sense of power they gave us.

The concepts explained in this book are not complicated. They are profound yet easy to grasp. Most are not original to Clarke; his genius is in knowing which ideas ring true and how they fit together in a larger pattern. Clarke teaches a mental attitude rather than a set of facts or precepts. He wants the reader to see our civilization anew, to appreciate our amazing accomplishments, and to feel upset at the waste and foolishness of our excesses.

Profiles, Not One Profile

This book is not about how the future is likely to develop, it is about the multitudinous ways it might develop. Clarke emphasizes that he is talking about many profiles, many potentials, some wonderful, some dreadful. This book teaches you how to think about the future. It does not predict the future, it delineates different ways in which the future might unfold. Clarke says in the Introduction:

> It is impossible to predict the future, and all attempts to do so in any detail appear ludicrous within a very few years. This book has a more realistic yet at the same time more ambitious aim. It does not try to describe the future, but to define the boundaries within which possible futures must lie . . .

No one could agree with all of the opinions and ideas expressed in this book because Clarke loves to contradict himself and look at all sides of the problem, including many sides that most people never dream. He predicts something and then he predicts the opposite. After carefully explaining that terrestrial transportation may reach fantastic speeds, he doubles back and says maybe it won't, because improved communications might eliminate most travel. After predicting we will raid the whole solar system for raw materials and precious metals, he says maybe we will learn to transmute elements on an industrial scale, and learn to replicate any object down to the last atom, so we will no longer need to transport raw materials or finished goods.

Clarke disavows any intention of predicting the one and only future, and he does not try to make short term predictions that will soon turn ludicrous. He says it is easier to predict how things will ultimately be in a thousand years than it is to know how far they will progress in twenty years. Yet he did make many short term predictions, and many have turned out to be correct. Naturally, some were wrong. He predicted that supersonic transport aircraft (SST) would be commonplace by the 1970s, but only the Concorde was built back then, and it is not an economical mode of transport. He devoted a chapter to hovercraft and predicted they might replace automobiles for land transport. He did not realize the drawbacks: they are noisy and difficult to control on a grade, although they do work well over oceans and marshes, and make excellent ice breakers. He correctly notes that they have limited commercial potential because they use more energy than competing systems, but he anticipates energy is bound to become cheaper and cheaper, thereby making the use of hovercraft more financially competitive.

Clarke was too optimistic about the near future. He predicted we would begin colonizing planets by the year 2000, and we would develop fusion power by 1990 and translating machines by 1970. He was careful to add caveats that it might take much longer, perhaps a century or more. Perhaps the difference between a generation and a century is not significant. After Columbus discovered America, British colonization was, in some sense, inevitable, although it did not begin for 115 years. From our point of view, the world did not change much between 1492 and 1607. After the piston steam engine was developed by Newcomen in 1712, the steam locomotive was

New Energy Times Archive

inevitable, although 117 years passed before the first locomotive was built. Rockets may not last long, but some form of spacecraft will inevitably lead to manned exploration and colonization of the moon, mars, and other planets, perhaps on the same time scale as North American colonization. Some form of nuclear energy must inevitably replace fossil fuel, because the advantages are so great, although it may take as long to develop as the steam locomotive did.

We do not know enough about language or intelligence to build a translating machine yet. Artificial intelligence is still controversial. Many believe it will never come to pass, but Clarke confidently sticks to his prediction that it is inevitable, and I agree with him. This too might take as long as the steam locomotive. Machines will be at least as intelligent as a rat, where intelligence is defined as the ability to react to and deal with the environment. It is inconceivable to me that no computer will ever be smart enough to drive an automobile in traffic, answer factual questions, or lay bricks. I doubt that computers will ever write novels, but they will write technical manuals. They will probably never develop emotions, and possibly not self awareness, but Clarke rejects the argument that the brain is a special state of matter which machinery cannot emulate.

The Space-Station: Its Radio Applications

1. *The space station was originally conceived as a refueling depot for ships leaving the Earth. As such it may fill an important though transient role in the conquest of space, during the period when chemical fuels are employed. Other uses, some of them rather fantastic, have been suggested for the space station, notably by Hermann Noordung.*[1] *However, there is at least one purpose for which the station is ideally suited and indeed has no practical alternative. This is the provision of world-wide ultra-high-frequency radio services, including television.*

2. *In the following discussion the word "television" will be used exclusively but it must be understood to cover all services using the u.h.f. spectrum and higher. It is probable that television may be among the least important of these as technical developments occur. Other examples are frequency modulation, facsimile (capable of transmitting 100 000 pages an hour*[2]*), specialized scientific and business services, and navigational aids.*

3. *Owing to bandwidth considerations television is restricted to the frequency range above 50 Mc/sec and there is no doubt that very much higher frequencies will be used in the immediate future. The American Telephone and Telegraph Company are already building an experimental network using frequencies up to 12 000 megacycles.*[3] *Waves of such frequencies transmitted along quasi-optical paths and accordingly receiver and transmitter must lie not far from the line of sight. Although refraction increases the range, it is fair to say that the service radius for a television station is under 50 miles. (The range of the London service was rather less than this.)* As long as radio continues to be used for communication, this limitation will remain, as it is a fundamental and not a technical restriction.

4. *Wide-band frequency-modulation, one of the most important of radio developments, comes in the same category. FM can give much better quality and freedom from interference than normal amplitude-modulation, and many hundreds of stations are being planned for the post-war years in America alone. The technical requirements of FM make it essential that only the direct signal be used, and ionospheric reflexions cannot be employed. The range of the service is thus limited by the curvature of the Earth, precisely as for television.*

5. *To provide services over a large area it is necessary to build numerous stations on high ground or with radiators on towers several hundred feet high. These stations have to be linked by landline or subsidiary radio circuits. Such a system is practicable in a small country such as Britain, but even here the expense will be enormous. It is quite prohibitive in the case of a large continent and it therefore seems likely that only highly populated communities will be able to have television services.*

6. *An even more serious problem arises when an attempt is made to link television systems in different parts of the globe. Theoretical studies*[2] *indicate that using a radio relay system, repeater stations will be necessary at intervals of less than 50 miles. These will take the form of towers several hundred feet high, carrying receivers, amplifiers and transmitters. To link regions several thousand miles apart will thus cost many millions of pounds, and the problem of trans-oceanic services remains insoluble.*

7. *In the near future, the large airliners which will fly great circle routes over oceans and uninhabited regions of the world will require television and allied services and there is no known manner in which these can be provided.*

8. *All these problems can be solved by the use of a chain of space stations with an orbital period of 24 hours, which would require them to be at a distance of 42 000 km from the centre of the Earth (Fig. 1). There are a number of possible arrangements for such a chain but that shown is the simplest. The stations would lie in the Earth's equatorial plane and would thus always remain fixed in the same spots in the sky, from the point of view of terrestrial observers. Unlike all other heavenly bodies they would never rise nor set. This would greatly simplify the use of directive receivers installed on the Earth.*

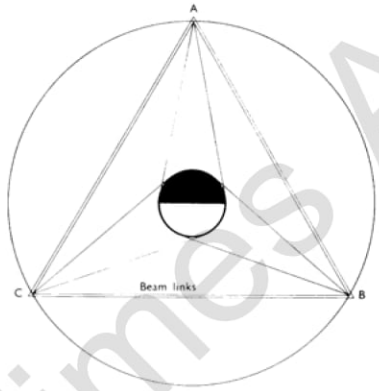


Fig. 1.

9. *The following longitudes are provisionally suggested for the stations to provide the best service to the inhabited portions of the globe, though all parts of the planet will be covered.*

30 *E—Africa and Europe.*
150 *E—China and Oceana.*
90*W—The Americas.*

10. *Each station would broadcast programmes over about a third of the planet. Assuming the use of a frequency of 3000 megacycles, a reflector only a few feet across would give a beam so directive that almost all the power would be concentrated on the Earth. Arrays a metre or so in diameter could be used to illuminate single countries if a more restricted service was required.*

Six copies typed: privately circulated May 1945. Top copy now in National Air and Space Museum, Smithsonian Institution, Washington, D.C.
[Reprinted in *Spaceflight*, Vol. 10, No. 3, March 1968, pp. 85-86.

From Ascent to Orbit, A Scientific Autobiography —The Technical Writings of Arthur C. Clarke, 1984

Information Still Current

I combed this book for errors and out-of-date information. The only substantial error I found was the statement that fire walking might reflect the power of the mind over matter. This was widely believed in 1963, but as early as 1935 experiments at the University of London revealed the physical reasons why fire walkers are not hurt.

Predictions about Resources and Energy

Long before cold fusion was discovered, Clarke, Von Neumann and a few other farsighted people said that energy costs were bound to fall, and they will eventually drop to negligible levels. When the energy crisis struck, Clarke was the only person with the guts to say "the age of cheap energy is over, the age of free energy is fifty years in the future." Critics call this utopian nonsense, but I think they are ignoring the nature of energy and the trends of history. The nature of energy is simple: it is the most abundant resource in the universe. Clarke points out that the sun produces 5 x 10^{23} horsepower, and the ocean has enough deuterium to run all of the industries on earth for hundreds of millions of years with fusion. The cost of energy has steadily fallen throughout industrial history. It is now thousands of times cheaper than it was before the industrial revolution. Taking into account energy used in industry, every person in the first world has at his beck and call hundreds of horsepower. In 1798, a family might have had a horse or an ox, and perhaps a two-horsepower mill stream. Many people had no mechanical assistance. They walked. They lifted, cut and hoed by hand. That every person would someday have at his command the equivalent of five hundred horses would have seemed beyond imagination.

Clarke is no Dr. Pangloss, and no cheerleader for the latest fad. Recently he has written in support of nuclear fission as a necessary evil, because coal pollution kills even more people than Chernobyl did. In *Profiles* he came out squarely against it, a daring position in 1963:

> It is not likely that fission reactions . . . will play more than a temporary role in terrestrial affairs. One hopes they will not, for fission is the dirtiest and most unpleasant method of releasing energy that man has ever discovered. Some of the radioisotopes from today's reactors will still be causing trouble, and perhaps injuring unwary archeologists, a thousand years from now. But beyond fission lies fusion . . .

Again and again, Clarke says open your eyes, look at the longer view of history, think of how much we have accomplished already. Do not despair or imagine that we have reached the limits of our abilities. He sees miraculous ingenuity where most of us take things for granted. He is right of course; we have merely forgotten how amazing the mundane artifacts of our civilization are. Clarke continually reminds us, and I wish people would heed the message. He also reminds us not to be sanguine about our prospects. "If, as is perfectly possible, we are short of energy two generations from now, it will be through our own incompetence. We will be like Stone age men freezing to death on top of a coal bed."

Clarke demolishes the idea that we are running out of natural resources. Pollution is the only danger caused by exploiting raw materials. He points out, for example, that one hundred

New Energy Times Archive

tons of average igneous rock contains 8 tons of aluminum, 5 tons of iron, 1,200 pounds of titanium . . . It would take a great deal of energy to process the rock and extract these raw materials, but the rock also includes uranium and thorium with the potential energy of 50 tons of coal." All the energy we need for the processing is there in the rock itself." A cubic mile of seawater contains 18 million tons of magnesium, "enough to supply the world's needs, at the present rate, for several centuries." If that is not enough, we could eventually bring in resources from other planets and asteroids. He concludes:

> This survey should be enough to indicate—though not to prove—that there need never be any permanent shortage of raw materials. Yet Sir George Darwin's prediction that ours would be a golden age compared with the aeons of poverty to follow, may well be perfectly correct. In this inconceivably enormous universe, we can never run out of energy or matter. But we can all too easily run out of brains.

Gives Life a Sense of Déjà Vu

Translation computers have not yet come to pass, but Clarke predicted much else successfully. I sometimes get a sense of déjà vu when I read the latest breathless pronouncements in newspapers and trade magazines. For example, Clarke predicted that an "orbital newspaper" would be delivered by facsimile. Today national editions of newspapers like the *New York Times* and *USA Today* are distributed by electronic mail and printed in local plants near major cities. The *Satellite Edition* of the *Yomiuri* newspaper is printed in Georgia and delivered to my house a few hours after it hits the streets in Tokyo. Thanks to the international date line, I read the August 2 edition on August 1. With a satellite dish I could also tune into 24 hour broadcasts of Japanese television, available in North America by subscription.

Clarke did not get every detail right, naturally. The paper *Satellite Edition* is not quite what he had in mind. He thought you would print the newspaper yourself at home, printing only the sections you want. He described a "personalized" newspaper much like an Internet "zine." Compare Clarke's description of the orbital newspaper to the "zines." He begins by explaining that a facsimile machine will be capable of printing the image that appears on a TV screen:

> When you want your daily paper, you will switch to the appropriate [TV] channel, press the right button—and collect the latest edition as it emerges from the slot. It may be merely a one-page news sheet; the editorials will be available on another channel—sports, book reviews . . . etc. We will select what we need, and ignore the rest, thus saving whole forests for posterity . . .
>
> Nor will the matter end here. Over the same circuits we will be able to conjure up, from central libraries and information banks, copies of any document we desire from Magna Charta to the current Earth-Moon passenger schedules. Even books may one day be "distributed" in this manner . . .

In two short paragraphs you have: the Internet; the web; interactive, personalized "zines"; sophisticated printing at home; and informed concern for conservation long before it became fashionable. Some people were surprised by the Internet, but I read about it thirty years ago. I knew it was coming. I feel almost jaded.

Clarke was not the first to come up with these ideas. Computer experts were discussing them in 1963, although my textbook from that era describes only timesharing and centralized government information data bases. The point is, Clarke is not a computer expert. He did not limit himself to speculation in one narrow specialty such as telecommunications and computer data bases. He read the technical literature, picked the right ideas and added a number of original ideas of his own. He makes equally good prognostications about energy, food production, and transportation. Not many computer experts in the 1950s and '60s would have made such bold, accurate predictions anticipating the Internet. None, except perhaps Von Neumann himself, were such polymaths they could have written another authoritative article dealing with energy, and another about space exploration. And none, I think, would have written speculative articles about time travel, immortality or invisible men. Most scientists and computer engineers would be embarrassed to discuss such far-out topics. Clarke knows as well as anyone how far-out they are. He thinks time travel into the past is probably impossible, but a one-way trip into the distant future may be possible with hibernation or near-light speed space travel. He explains that we cannot be sure these are impossible because they are so far beyond our current understanding. Then, after carefully establishing caveats, he lets himself go and speculates to his heart's content. He is not afraid to have a good time even at the risk of making a fool of himself.

When cold fusion was announced in the *Wall Street Journal* I was surprised but not profoundly shocked because I recalled these passages from *Profiles* describing the development of the atom bomb:

> Suppose you went to any scientist up to the late nineteenth century and told him: "Here are two pieces of a substance called uranium-235. If you hold them apart, nothing will happen. But if you bring them together suddenly, you will liberate as much energy as you could obtain from burning ten thousand tons of coal." No matter how farsighted and imaginative he might be, your pre-twentieth century scientist would have said: "What utter nonsense! That's magic, not science. Such things can't happen in the real world." Around 1890, when the foundations of physics and thermodynamics had (it seemed) been securely laid, he could have told you exactly why it was nonsense.
>
> "Energy cannot be created out of nowhere," he might have said. "It has to come from chemical reactions, electrical batteries, coiled springs, compressed gas, spinning flywheels, or some other clearly defined source. All such sources are ruled out in this case—and even if they were not, the energy output you mention is absurd. Why, it is more than a million times that available from the most powerful chemical reaction!"
>
> The fascinating thing about this particular example is that, even when the existence of atomic energy was fully appreciated—say right up to 1940—almost all scientists would still have laughed at the idea of liberating it by bringing pieces of metal together. Those who believed that the energy of the nucleus ever could be released almost certainly pictured complicated electrical devices—"atom smashers" and so forth—doing the job. (In the long run, this will probably be the case; it seems that we will need such machines to fuse hydrogen nuclei on the industrial scale. But once again, who knows?)
>
> The wholly unexpected discovery of uranium fission in 1939 made possible such absurdly simple (in principle, if not in practice) devices as the atomic bomb and the nuclear chain reactor. No scientist could ever have predicted them; if he had, all his colleagues would have laughed at him.

New Energy Times Archive

What do we learn from this? Clarke never imagined cold fusion, and he knew nothing about the 1930s cold fusion experiments by Paneth and Peters or the ideas Martin Fleischmann had been secretly pondering for a decade, yet Clarke managed to predict many key aspects of cold fusion:

That it would be a complete surprise. Only Fleischmann anticipated cold fusion.

That it would be a departure from methods conventional fusion energy scientists were working on.

That it would be simpler than anyone anticipated. Clarke gives many other examples of surprisingly simple revolutionary devices, including: the phonograph, which is so simple the ancient Greeks might have made one; and spectroscopic analysis of starlight, which is the basis of astrophysics.

That it would be tantamount to magic. Cold fusion does not merely defy existing theories. It seems to supercede them. It makes them irrelevant, because nuclear reactions in metal lattices apparently bear little resemblance to reactions in the sun. Soon after the discovery of fission in 1938, theories were rapidly developed and adjusted to account for the new phenomenon. Some experts predict that cold fusion will also be explained by conventional theory, but at the moment it seems alien to what we have previously learned.

Clarke also predicted that cold fusion would be angrily rejected by the establishment. He devotes the first chapters of the book to elegant essays describing similar events, as he formulates his First Law:

> When a distinguished but elderly scientist states that something is possible he is almost certainly right. When he states that something is impossible, he is very probably wrong.

Anyone could have predicted this reflexive rejection. Most people know stories of martyrs like Galileo and Semmelweis. Yet despite these well-known examples and the lip service paid to this important topic, it is neglected by most historians of science. Clarke is one of the few people to look closely at history and come up with memorable examples of the syndrome. Once the argument is settled, controversy in science tends to be swept under the rug. The battles for acceptance are forgotten, heros are elevated, the opposition is caricatured, and in general people forget the extent to which irrational opposition must be overcome every time someone with an innovation appears on the scene.

An Easy Book to Read

Clarke is well read. His enthusiasm for ideas is contagious. This book will introduce a young reader to dozens of people, and inspire him to learn more. It quotes Roger Bacon, Francis Bacon, Charles Babbage, August Compte, Ernest Rutherford, George Darwin, James Conant, H.G. Wells, Vannevar Bush, Arnold Toynbee, J.B.S. Haldane, Norbert Weiner, and several people Clarke disagrees with, including Lewis Mumford.

Clarke quotes and describes people you will not meet in an ordinary futurist book, including Hu Shih, Peter Arno, H.P. Lovecraft, Madame Blavatsky, Freud, Swift, Orwell, Shakespeare, Matthew Brady, Nikolai Ivanovich Lobachevski and his nemesis Tom Lehrer, and many others. With this crowd jostling through the pages of the book you might wonder where Clarke manages to squeeze in his own point of view. Not to worry: He is never reticent about expressing himself, and he discusses many of his own personal tastes. He inserts forthright, sometimes opinionated, often hilarious views on subjects not related to the central themes of the book, Beatniks, modern art, lawyers ("parasites"), capitalism versus communism, AM radio stations in small towns in the deep south of the U.S. ("harrowing"), evolution, the "obvious" necessity of death but not aging for biological and social progress, the strange evocative power of poetry to stir the imagination and stick in memory, the "appalling" esthetics of Detroit automobiles (see above quote), friendship, craftsmanship, and love. Returning to his main subject, Clarke compares Homer, Shakespeare, Melville, Conrad and Twain. He says their work is characteristic of an age of discovery, and the opening of new frontiers. Here is an irresistible quote about weightlessness, dreams, sports and erotica:

> The absence of gravity—a sensation which no human being has ever experienced since the beginning of time, yet which is mysteriously familiar in dreams—will have a profound impact upon every type of human activity. It will make possible a whole constellation of new sports and games and transform many existing ones. This final prediction we can make with confidence, if some impatience: Weightlessness will open up novel and hitherto unsuspected realms of erotica. And about time too.

In the midst of these serendipitous excursions, he manages to review laws of physics like the conservation of energy and the reason objects are weightless in an orbiting spacecraft. He includes many technical details such as the fact that televisions transmit 250,000 bits in one-thirtieth of a second, the melting point of hafnium carbide is 7,500 deg F, and the names of various newly discovered (as of 1963) specialized instruments used to probe the structure and atomic distribution of matter. "Neutron activation analyzers, infrared and X-ray spectrometers, gas chromatographs can perform, in a matter of seconds, detailed analysis of complex materials over which the chemists of a generation ago could have labored in vain for weeks."

With all the information packed into the 232 pages of this book, you might suppose it is tough to read. I have seen textbooks with fewer facts per page. Every page confronts you with a novel idea; a fascinating juxtaposition; or another inventor, scientist, philosopher, author or cartoonist. If you expect reading this will be a mental chore, it will come as a pleasant surprise to learn that some of the chapters in the book originally appeared as articles in popular magazines, including *Holiday Magazine*, *Horizon*, *Science Digest*, and *Playboy*. This is not difficult writing. It is fun, witty, literate. It is like browsing through old *New Yorker* cartoons. It resembles Clarke's science fiction stories. Indeed, he reveals the basic technical ideas that inspired many of the stories. You can enjoy this book on the train commuting to work, or lolling in the bathtub. (Clarke advocates browsing and lolling, although he never seems to slow down himself. He thinks it would be a good idea for the human race to rediscover the ancient pace of life, the leisure and the joys of peace and quiet, and walking in the garden.) I recommend you read the book three times. Once for the pleasure of good writing and wit, once for a quick review of physics you may have forgotten, and once more to look into the future, near and distant, stretching even to the ultimate fate of the human race.

Note to Readers

Profiles was originally published in 1963. It has been reprinted many times, most recently in 1985. Unfortunately, it is now out of print. You can find a copy in the library, a used book store, or on the Internet. Clarke says he has been thinking of reissuing the book in CD ROM format.

As of 1992 Clarke had published 23 other nonfiction books and essay collections. Here are two I highly recommend: *The View from Serendip* (Dell Ray, 1977) which covers themes similar to *Profiles*, and *How the World Was One* (Bantam, 1992), about telecommunications. I also recommend his many science fiction stories. As he says in the introduction to *Profiles:* "A critical—the adjective is important—reading of science fiction is essential training for anyone wishing to look more than ten years ahead. The facts of the future can hardly be imagined *ab initio* by those who are unfamiliar with the fantasies of the past."

New Energy Times Archive

2001: The Coming Age Of Hydrogen Power

Arthur C. Clarke

Fellow of King's College, London; Chancellor, International Space University
Chancellor, University of Moratuwa

(Address to Pacific Area Senior Officer Logistics Seminar (PASOLS) on March 29, 1993, Hilton Hotel, Colombo. The audience included Adm. Larson, Commander-In-Chief of the Pacific Fleet, Lt. Gen. Stackpole of the Marines, and leading officers of the military forces from many other countries, including Australia, India, Japan, Korea, Russia, the Philippines, Sri Lanka, and others.)

Admiral Larson, Lieutenant General Stackpole, Major General Abayaratna, distinguished guests—I'm very happy to be here today, even though I should really be in Washington this week. On Thursday, all my friends there will be gathered in the Uptown Theatre to celebrate the 25th anniversary—I can't believe it!—of *2001: A Space Odyssey.*

Now, that movie provides a very good example of how difficult it is to predict the future. You may recall that in the film we showed the Bell System and PANAM; well, they've both gone, long before 2001. But I'm happy to see that the Hilton, which we also showed in 2001, is still here, though not yet in orbit!

This proves how impossible it is to predict social and political developments: who could have imagined what's happened in Europe during the last few years? However, we can, to some extent, anticipate *technological* developments by observing what's going on in science and engineering. But the problem there is predicting *when* things will happen, even though one can be quite certain that they will.

A good example is provided by my 1945 paper on communications satellites, which I imagined would be large, *manned* space-stations. When I wrote that, World War II was still in progress, and I was working on Ground Controlled Approach Radar, which had the then enormous number of something like a thousand vacuum tubes in it, at least one of which would blow everyday. So it was impossible to believe, back in 1945, that TV relay stations could operate without a staff of engineers changing tubes and checking circuits. But of course, the transistor and the solid state revolution came along within a few years, and what I'd assumed would have to be done by large manned stations could be achieved by satellites the size of oil drums. So everything I imagined would be done around the end of the century happened decades in advance.

Now, I'm going to say very little about communications satellites and the communications revolution, because you are all very familiar with what's happened here. Essentially anything we want to do in this area can now be done. And satellites have not only transformed communications, but meteorology and navigation. You all know what the GPS (Global Positioning System) did during Desert Storm. However, the satellites I have always been particularly interested in are what I call "Peacesats"—the reconnaissance satellites which have been largely responsible for the Cold War never becoming a hot one, by creating a transparent world, and vastly reducing the threshold of uncertainty. But I won't say any more about satellites, because (if I may be allowed a commercial) I've just written a whole book about them, *How The World Was One*.

So now I want to change the subject completely, to something perhaps even more important than the communications revolution. But first I'd like to mention a bit of forgotten history.

In December 1903, Orville and Wilbur staggered off the ground in North Carolina, and made the first controlled flight in a heavier-than-air machine. As a result, the North Carolina state motto is "First in Flight"—which you military men may well think a rather unfortunate choice of words.

Yet for five years, Washington didn't believe that the Wright brothers had actually flown—because everybody *knew* it was impossible: leading scientists were still writing papers proving it couldn't be done. Not until the Wrights went to France and started giving public demonstrations did the boys in the War Department say, "My goodness, these things really *can* fly. Perhaps they may even be useful for reconnaissance. We'd better look into it." And they did - five years late. Well, history has just repeated itself, with what's been (perhaps inaccurately) named "cold fusion."

You all know, of course, that the Sun is powered by the fusion of hydrogen atoms, when they combine to make helium. Tremendous efforts have been made to reproduce this reaction on earth and produce virtually unlimited amounts of energy; the only successful attempt to do this so far is the hydrogen bomb. Literally billions of dollars have been spent in efforts to reach the multi-million degree temperatures in the heart of the Sun, where this reaction occurs. One day these experiments will succeed, but so far only a few percent of the input energy has been obtained, for very short periods of time.

However, just four years ago, two scientists named Pons and Fleischmann claimed to have achieved "cold fusion" *at room temperature* in certain metals saturated with deuterium, the heavy isotope of hydrogen. Under these conditions, they reported that they were getting out more energy than they put into the system. This, of course, created a worldwide sensation, and many laboratories tried to repeat the experiments. They all failed, and Pons and Fleischmann were laughed out of court. That was the last anyone heard of them for a couple of years.

But meanwhile, there had been an underground movement of scientists who believed that there might be something in all this business, and started experiments of their own—often in defiance of their employers. Pons and Fleischmann went to France just like the Wright Brothers! —and are now working in a laboratory near Nice, financed by a Japanese consortium, Technova. Even more significant, Japan's Ministry of Industry and International Trade (MITI) is investing millions of dollars in an effort to commercialize the new technology.

The laboratories of NIT - the Japanese telecommunications organization - recently announced positive results, and just before last Christmas, NTT started selling "Do-it-Yourself" Cold Fusion Kits for $565,000 each. I don't know how many of them were snapped up, but that price sounds a bargain for a discovery that could change the world...

In October 1992, the Third International Cold Fusion Conference took place in Nagoya, Japan, and was attended by over 300 scientists. The highlights of the conference have been summarized in a 34-page report by Professor Peter Hagelstein, of MIT's Research Laboratory in Electronics. Other reports confirming positive results have been issued by the U.S. Navy Air Weapons Center, the U.S. Army Research Office in Japan, SRI International, and many others.

New Energy Times Archive

It is now beyond serious dispute that anomalous amounts of energy are being produced from hydrogen by some unknown reaction. The term "cold fusion"—"C/F"—has stuck because no one can think of anything better. However, the sceptics who originally pooh-poohed the whole thing did have a very good point. If it really *was* fusion, the experimenters should be dead! Where were the neutrons and gamma rays and tritium and helium—the lethal "ashes" such a reaction should produce? Well, they have now been detected—but in quantities far too small to account for the energy liberated. The theoretical basis of C/F is therefore still a major mystery—as was the energy produced by radioactivity and uranium fission when they were first discovered.

Now, what are the implications of this? I'd like to give several scenarios.

The first: there's a conspiracy of hundreds of scientists in dozens of countries. They're either totally incompetent—or they're superbly organized, and out to make a killing in oil and coal shares.

Slightly more probable: C/F is a laboratory curiosity, of great theoretical interest but no practical importance. Frankly, I doubt this. Anything so novel indicates a breakthrough of some kind. The energy produced by the first uranium fission experiments was trivial, but everyone with any imagination knew what it would lead to.

The next scenario: C/F can be scaled up to moderate levels - say 100-1000 kilowatts. Even that could be revolutionary, if cheap and safe units can be manufactured. It would make possible the completely self-contained home that Buckminster Fuller envisaged, because the electric grid would no longer be necessary for domestic distribution. And it would be the end of the gas-fueled car—none too soon...Automobiles could, quite literally, run on water—though perhaps only heavy water!

The third possibility is that there are no upper limits: in that case, the Age of Fossil Fuels has ended. So has the Age of CO_2 buildup, acid rain, and air pollution.

Twenty years ago, when OPEC quadrupled oil prices, I remarked, "The age of cheap power is over—the age of *free* power is still fifty years ahead." I may have been slightly too pessimistic...

However, coal and oil will always be essential raw materials for an unlimited range of products - chemicals, plastics, even synthetic foods. Oil is much too valuable to burn: we should eat it.

Now please fasten your seat belts: after these modest daydreams, I want to really stretch your imaginations...

Back in 1982, I published *2010: Odyssey II* and dedicated it to my friend, Cosmonaut Alexei Leonov and to Academician Andrei Sakharov, then in exile in Gorky. I knew that Sakharov had worked on low-temperature nuclear fusion (as well as on the H-bomb!) and in the novel I suggested that, in his enforced solitude, he'd invented a spaceship engine based on these principles...

He didn't, of course, so that's a piece of fictitious history. However, three Russian scientists who have indeed been working on nuclear propulsion for rockets have now got into the cold fusion act, and they have just published some startling results in *Physics Letters A*, one of the world's leading scientific journals. They are obtaining about five times their energy input in *gas mixtures*, not solids, and at temperatures of up to 1800°C. Now this is not exactly "cold" fusion, but it's certainly ice-cold compared with the tens of millions of degrees the hot fusioneers are talking about.

And it's very interesting indeed from the point of view of rocket propulsion. If a plasma fusion rocket could be developed, it would open up the solar system, just as the airplane opened up this planet. It's not generally realized that the energy cost of going to the Moon is less than a hundred dollars in terms of kilowatt hours of electricity. The fact that the Apollo round tickets cost about two billion dollars per passenger is a measure of the chemically-fueled rocket's inefficiency.

Well, back to Earth. I'd like to read you a letter which I sent to Vice-President Al Gore last week; it should have reached him by now:

18 March 93

Vice-President
Al Gore

Dear Mr. Gore,

COLD FUSION (?)

I am happy to learn that you are being briefed on the above—perhaps misnamed—subject, as it is impossible to imagine anything of greater potential importance from both the economic and geopolitical points of view.

After initial skepticism, I have now seen so many positive reports from highly respected organizations (*e.g.* NTT- which is already marketing experimental kits in Japan!—ONR, U.S. Army Research Office, SRI, MIT) that there can be no further doubt that excess energy is being produced by some previously unknown process, not essentially nuclear. I am sure that your staff has already seen much of this material, and I also refer you to Representative Swett's statement in the Congressional Record for 16 February, 1993.

Whatever the source of the energy, which I am sure will be elucidated in the fairly near future, the sixty-four trillion dollar question is: (1) is this merely a laboratory curiosity of no practical importance, or (2) can it be scaled up for industrial and perhaps even domestic use?

If Number (2) is correct, the consequences are immeasurable. It would mean essentially the end of the "Fossil Fuel Age" and an era of cheap, clean power. The environmental benefits would be overwhelming; at the very least, concern with CO_2 build-up and acid rain would vanish.

Clearly, no effort should be spared to resolve this matter speedily, by supporting scientists who are obtaining results (and, perhaps, discouraging those who have been obstructing them). One witness you might call is my friend, Dr. George Keyworth II, President Reagan's Science Advisor and an expert on fusion physics, who remarked in a recent letter to me: "The conventional path we've been pursuing is trying to build a bridge across the seas instead of inventing a boat." Perhaps "cold fusion" may give us the lifeboats Spaceship Earth so badly needs!

Respectfully,
Arthur C. Clarke

And as Stop Press, I should mention that Representative Dick Swett has just made the same point in a statement to the House Committee on Energy (26 March). Let's see if it produces more energy than went into it.

In conclusion: with monotonous regularity, all throughout history, religious crackpots have predicted the imminent end of the world. I have about 90% confidence that I'm now doing something very similar.

And this time, it's good news.

References

1. "The Third International Conference on Cold Fusion," Drs. Victor Rehn and Iqbal Ahmad (U.S. Office of Naval Research, Japan).

2. "Anomalous Nuclear Reactions in Condensed Matter: A Report on the Third International Meeting on Cold Fusion," Dr. Iqbal Ahmad (U.S. Army Research Office [AMC] Far East).

3. "Summary of Third International Conference on Cold Fusion in Nagoya," Peter L. Hagelstein, Massachusetts Institute of Technology - Research Laboratory of Electronics.

4. "Nuclear Product Ratio for Glow Discharge in Deuterium," A.B. Karabut, Ya R. Kucherov and I.B. Savvatimova. *Physics Letters A* ,170 265 (1992).

5. "Deuterated Metals Research at SRI International," 4 March 1993.

New Energy Times Archive

DEVICE AND PROCESS TESTING UPDATES

Conducted by Eugene Mallove and Ed Wall

At our New Energy Research Laboratory (NERL) work has proceeded on testing the Kinetic Furnace cavitation reactor (see cover story, *IE* No. 19). Results continue to be disappointing in Bow, NH—nominally measured COP in the range 1.0 to 1.15, inadequate to call the performance here definitively over-unity. Work is proceeding to alter the rotation speed of the cavitation rotor, first only slightly by several tens of rpm from the baseline 3,450, by altering the line voltage with transformers. Interesting trends are beginning to be observed. Later NERL plans to achieve more drastic fractional changes in rotor speed by replacing the single-phase electric motor with a three-phase frequency-controlled motor.

We regret to report the very sad news that Eugene Perkins, one of the co-inventors of the Kinetic Furnace, died suddenly in mid-September from a vascular-related problem. He will be missed deeply, both as an outstanding, creative human being and as a key participant in this project. Ralph Pope, his friend and co-inventor, has assured us that he is committed to seeing the Kinetic Furnace achieve the consistent results that we all hope for, which will lead to commercialization in the water heating market.

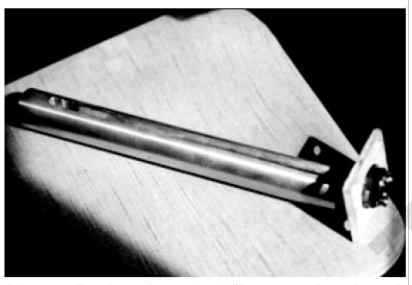


Figure 1. The aluminum fillet that gives much better heat transfer from the immersion heater than the tubular hot finger heater. (Shown inserted into dewar reactor in other figures.) (Photo: L. Case)

Very big news on the testing front has occurred outside NERL. Dr. Les Case of Fusion Power, Inc. in New Hampshire (see *IE* No. 19) has had one catalytic fusion cell sustain for two months (and *continuing!*) a temperature elevation with deuterium gas that is 35 °C above the baseline reached with ordinary hydrogen. Operating temperature is holding steady at 215 °C. Case has fashioned a much larger unit in a stainless steel dewar cell that he believes will reach the desired goal of self-sustainment soon. It can contain as much as a kilogram of activated palladium-carbon catalyst.

Figure 2. This is the new reactor vessel—a modified large stainless steel dewar. It is pressure tight enough for testing. (Yardstick alongside for scale.) (Photo: L. Case)

Catalytic fusion by Dr. Case has prompted serious involvement by SRI International, after Russ George (now of Saturna Technologies, Inc.) replicated the Case process in a cell that he fashioned at SRI International. He measured over 10 ppm helium-4 in an active cell, which built up over time from virtually zero background He-4. The blank control cell containing ordinary hydrogen apparently showed no helium-4 build up and no temperature elevation.

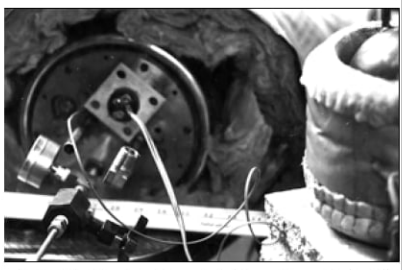


Figure 3. The new reactor vessel covered with fiberglass insulation. When the vessel is at working temperature, the outside gets hot and needs additional insulation. (Photo: L. Case)

Please note the thermal analysis report in this issue (p. 50) by Don Slack of Aqua Environment, Inc. This suggests that the high temperature elevations being seen in Case cell experiments cannot be explained by thermal heat transfer differences between deuterium gas and ordinary hydrogen.

Russ George's first attempt to run a Case cell resulted in a failure at SRI. Colleague Akira Kawasaki reports that the cell "was isotropically configured like EarthTech's cell" that failed to show evidence of excess heat. George replicated the experiment with a catalyst configuration closer to the Case cell's geometry, *i.e.* a non-isotropic cell. This is the configuration that ultimately worked. Further replication efforts, using Russ George's cells, are now underway at SRI International and soon at Pacific Northwest Laboratories—a DoE lab that will perform replication studies to measure helium, under contract to Saturna Technologies, Inc. as well as at NERL.

The NERL/Case experiment set-up that we began in late October is as follows: A heater pad is at the bottom of a large Dewar. The cell sits on the heater. The goal is to calibrate the Dewar when the Case cell empty, to have a reference allowing us to make calorimetric determinations. This provides a means of determining the energy output of the catalyst/protium cell. We can defeat the mundane heat conduction/thermometry explanation for the higher temperature of the catalyst/deuterium cell by having a thermocouple in the space in the Dewar alongside the cell to run a comparison between the temperature vs. power curves for the two isotopes of hydrogen. If the airspace in the Dewar is considerably warmer for the deuterium, my conclusion would be that more heat is being generated, because the conduction medium (air) for the thermocouples is identical in both situations. We are monitoring temperature near the outside of the Dewar at two points to deflect the possibility that heat transfer from it to the environment is strongly affected by the surrounding air temperature changes.

Ohmori-Mizuno cells (see *IE* No. 20) continue to provoke interesting testing results elsewhere. One negative report on such a "plasma-electrolysis" cell comes from David Marett, a colleague of Dr. Paulo Correa.. Marett presented his paper at our Cold Fusion and New Energy Symposium on October 11. We reproduce his report in full in this issue (pages 20-21). When shown this report, Dr. Mizuno took exception to it, stating that it was not a faithful replication. Here is what Dr. Mizuno wrote to us concerning a huge number of experiments they have undertaken—over 50!:

Summary of Recent Ohmori Arc Discharge Experiments

Tadahiko Mizuno
Division of Quantum Energy Engineering,
Research group of Nuclear System Engineering,
Laboratory of Nuclear Material System,
Faculty of Engineering, Hokkaido University

Larger excess heat generation has been observed with the tungsten/light water system during arc discharge electrolysis. The arc discharge begins when electrolyte temperature reaches 75 ~ 80 degrees C. A few minutes after the discharge begins, the fluid begins rapid boiling. Excess heat measurements commence when the arc forms and continues for 30 minutes.

A variety of electrolytes have been tested including solutions of 0.25 ~ 0.5M Na_2SO_4, K_2SO_4, K_2CO_3, Rb_2CO_3, Cs_2CO_3, and

New Energy Times Archive

0.1M BaOH. Electrolysis voltage is set at 160V with a constant voltage power supply. Input is 75 ~ 120 watts.

With 120 watts, excess heat as high as 122 W (202%) has been observed. The lowest excess heat percent observed over the course of a 30-minute run was 138%. During this measurement period, excess heat did not decline. No such trend was observed, so it is assumed that heat generation would continue for a long time at a steady state. Three representative test results are shown below.

The following formula is used to determine excess enthalpy:

$$\text{Excess heat (H)} = W_{vap} + W_{sol} + W_{cell} + W_{wall} - W_{in}$$

Where: W_{vap}: the amount of heat needed to vaporize the water; determined by measuring the mass electrolyte before and after the experiment; W_{sol}: heat required to raise the electrolyte solution in the cell to boiling, determined from the mass and specific heat of the electrolyte; W_{cell}: heat required to raise the container temperature to 100 degrees C, the boiling temperature of electrolyte. This is based on the specific heat of the quartz glass container (0.3 calories/gram) times the mass of the container. [Editor's note: apparently the container weighs 3.5 kg.]; W_{wall}: heat losses over 30 minutes from the electrolysis cell wall to the outside; determined by observing the cooling curves starting at various temperatures, taking a minimum value from the curve; W_{out}: total output heat; W_{in}: electrolysis electric power consumption; current and voltage are continuously monitored and recorded, power is determined from these instantaneous values.

Experiment 1:

0.5M K_2CO_3 - H_2O 100 cc, average electric input = 0.48 amps

W_{wall} = 104 KJ — W_{vap} = 112.8 KJ —W_{sol} = 17.8 KJ — W_{cell} = 4.4 KJ —W_{out} = 239 KJ —W_{in} = 138 KJ

W_{out}/W_{in} = 1.73

[Editor's note: there was an arithmetic error in the original.]

Experiment 2:

0.25M Rb_2CO_3 - H_2O 100 cc, average electric input = 0.59 amps

W_{wall} = 104 KJ — W_{vap} = 218 KJ — W_{sol} = 17.8 KJ — W_{cell} = 4.4 KJ — W_{out} = 344.2 KJ — W_{in} = 170 KJ

W_{out}/W_{in} = 2.02

Experiment 3:

0.5M K_2CO_3 - H_2O 100 cc, average electric input = 0.54 amps

W_{wall} = 104 KJ — W_{vap} = 159 K J— W_{sol} = 17.8 K J— W_{cell} = 4.4 KJ — W_{out} = 285.2 KJ — W_{in} = 155 KJ

W_{out}/W_{in} = 1.84

Similar results were obtained in more than 50 other runs.

Regarding the paper by David Marett you sent: I have difficulty judging this because the measurement techniques are not described in detail, but let me speculate about some potential problems: 1. There are a number of critical differences in materials and conditions. First of all, electrolysis temperature is too low. Cathode materials are different (Al versus W). The solution and geometry (size of container, shape, positioning of electrodes) and other factors are different. In particular, we have used a variety of electrodes; however, as of this time we have only observed continuous excess heat when using tungsten electrodes.

2. One cannot make sweeping generalizations, but it appears these factors prevent excess heat.

3. In Marett's experiment, during the first phase of electrolysis apparent 142% excess heat is observed. This is ascribed to increased insulation caused by bubbles in the cell. I have doubts about this hypothesis.

Device testing continued on page 69

Cold Fusion and New Energy Symposium—1998

Manchester, New Hampshire • October 11, 1998

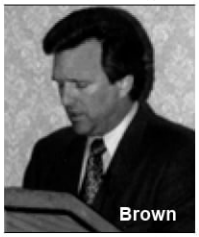
A Brief Report, by Eugene Mallove

Photos: Ed Wall

A day-long cold fusion-new energy "fest" occurred at the height of the New Hampshire foliage season. It was a congenial gathering of some 125 people who arrived at the Cold Fusion New Energy Symposium—1998. There were guests from 23 U.S. states and four foreign countries. The intense meeting, which was professionally video-taped in its entirety, lasted from the 9:00 a.m. opening, to 10:00 p.m. The final speaker list and their topics:

Dr. Eugene Mallove (*Infinite Energy* Magazine)
Cold Fusion and New Energy: Science, Technology, and Business
Dr. Peter Graneau
Lightning Generates MHD Power; The Cause of Thunder
Dr. Edmund Storms (Los Alamos National Laboratory, Retired)
My Life with Cold Fusion as a Reluctant Mistress
Dr. Paulo Correa (Labofex, Toronto, Canada)
Pulsed Abnormal Glow Discharge Reactor: An Update
Dr. Daniel Cavicchio (New Energy Partners)
Investing in New Energy Technologies
Jed Rothwell (*Infinite Energy* Magazine)
Cold Fusion Technology: Comparisons from the History of Technology
Mike Carrell (RCA, Retired)
The Arata-Zhang Experiments
Dr. Les Case (Fusion Power, Inc.)
Update on Catalytic Fusion
Dr. Peter Glück (Institute for Isotopic and Molecular Technology, Romania)
New Sources of Energy: Scale-Up, Problems, and Solutions
Dr. Thomas Phipps (Author, *Heretical Verities*)
Empirical Evidence of the Failure of the Lorentz Force Law
Jeff Kooistra (Physicist)
Reaction Forces and the Marinov Motor—Physical and Social
Hal Fox (Trenergy, Inc.)
Commercial Development: New Energy and Transmutation
Dr. Paul Brown (CEO, Nuclear Solutions, LLC)
The Nuclear Waste Problem—Solved by Nuclear Physics; Nuclear Batteries

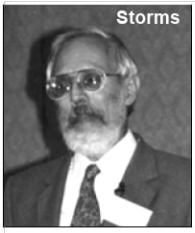
Several of these talks will appear as papers in forthcoming issues of *Infinite Energy*. There will be *no* separately produced "Proceedings." Those who wish to see and hear everything are advised to consider buying the professionally made tape set (which helps to offset the considerable expense of such a meeting). For example, Dr. Paul Brown of Nuclear Solutions, LLC, who spoke at length about nuclear waste remediation (the cover story in *IE* No. 21) will publish his Symposium report in *IE* Issue No. 23, "Transmutation of Nuclear Waste Products Using Giant Dipole Resonant Gamma Rays." On the other hand, his fascinating illustrated report on nuclear battery technology will not be the subject of a special paper.


Brown

Dr. Brown said in summary: "Application of the photo-remediation method would affect the design and long-term performance of nuclear repositories, if not eliminate the need altogether. This would provide for the selected recovery of fission products from spent fuel. The waste going to the repository would have less thermal power, would contain a reduced quantity of certain isotopes, occupy less volume, and could be incorporated in waste forms with good integrity. . . Application of this method to transmute nuclear waste products is a viable method for reducing the volume of nuclear waste. The solution of the nuclear waste problem also makes nuclear power a viable option."

Dr. Ed Storms, Los Alamos National Laboratory, retired, made some eloquent, bittersweet remarks about the cold fusion field. These will be published, in full, in a future issue of *IE*. He

New Energy Times Archive



noted in summary:

". . . major sources of funding of financial support have dried up, many self-funded individuals are moving on, and conventional rejection has solidified. Those of us who would like to see this field grow are encouraged by a few successes, such as Case, Arata, and Stringham, but even these approaches are woefully underfunded and are being studied by a very small number of individuals."

After pointed remarks about the difficulties of commercializing new energy technology, Dr. Paulo Correa provided a brief status report on the PAGD reactor. Mike Carrell, an ex-RCA engineer who has assessed Correas' device (see *IE* No. 8) comments on his presentation:

"He did outline the battery-exchange process by which he demonstrates that his system does produce measurable energy gain in the batteries as a result of extended operation as an isolated system with no connection to any external normal power source. Correa did show graphical results, which have to be interpreted in the context of an understanding of his battery calibration procedure. It is described in the patents and my articles in *IE*. Correa also showed selected pulses from the drive pack and into the charge pack, which appeared to be the same as shown in my article in *IE*."

"One of the audience asked the obvious question: could one hook a standard DC/AC inverter to the charge pack and derive the energy necessary to condition the PAGD for simple, self-sustaining operation as a 'Universal Battery Charger.' Correa indicated that this had been tried, with burn-outs of the inverters."

"I advise the community be cautious in jumping to conclusions about the PAGD and its test circuits, and to read my articles carefully. I didn't do a good job of illustrating the battery calibration and test cycle, leaving some uncertainties which have been pointed out. It's tough, and I made some mistakes. If anyone wants to correspond with me, I will try to convey the correct information. I advise also to assume that the PAGD may really release vacuum energy in a major way, and that these very energetic bursts have their own rules for interactions with the environment and connected circuits."

Mike Carrell himself gave an excellent review of the excess heat and helium-producing experiments of Drs. Arata and Zhang, work that he previously reviewed at length in *IE* No. 18.

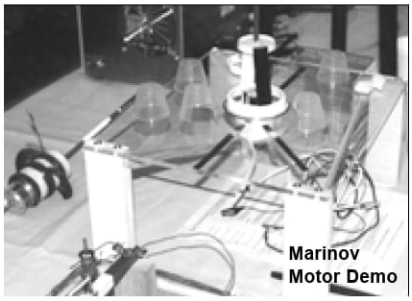
Dan Cavicchio of New Energy Partners outlined the criteria and philosophy of the LLP (Limited Liability Partnership) investment fund that he manages. The goal, he said, is to acquire positions in an increasing number of companies in the New Energy field, and to help bring products to market as soon as possible. There is a need, he suggested, to transition from the experiments of scientists in the laboratory, to robust devices in the marketplace.

Jed Rothwell provided an excellent historical perspective on the reasons why some technologies and discoveries suffer a long lag period before they are introduced to the marketplace.

Dr. Peter Graneau, always a captivating speaker, described his experiments with arcs generated by discharge of high voltage capacitors. These, he says, give a new understanding of thunder. He claims that there is major evidence of the release of chemical bond energy of the N_2 molecule, an energy source not credited by conventional discussions within chemistry. He also illustrated how magnetohydrodynamic behavior might be involved in lightning. He showed illustrations from some of his classic experiments with water arc explosions, in which the chemical bonding energy is suddenly released in association with a cold fog. These jets of water are capable of penetrating metal.

Among the many examples of Lorentz electric force law violations that he cited, Dr. Thomas Phipps described an elegant experiment involving a tuning fork and a wiring configuration which illustrate the interaction between current elements. He said that his results give support for the Ampere longitudinal forces acting on current elements. These forces, he suggests, illustrate that all is not well with the widely accepted physics of special relativity.

Jeff Kooistra gave a series of live demonstrations derived from the Marinov motor, which has been the subject of many past articles in *Infinite Energy*. His basement physics approach made use of styrofoam cups, and showed some seriously anomalous effects. The ultimate demonstration failed in person due to improper damping fluid—the wrong kind of "maple syrup." However, what was shown to the audience on video from a previous experiment was a true wonder to behold: Under certain circumstances, the current ring and the centrally suspended magnets rotated in the *same* direction—apparently inconsistent with Newton's third law! The Marinov motor gets weirder and weirder.



Hal Fox of Trenergy, Inc. presented his rationale for the charge cluster approach in rad waste remediation that he is pursuing. He, like Dr. Storms, addressed the issue of the severe lack of funding that has persisted in the field. It is tragic and outrageous that so many individuals with worthy projects, such as those discussed by Hal Fox, have been forced into severe circumstances after such a long and heroic struggle.

Dr. Peter Glück of Romania, who visited with us at NERL the week before the Symposium, outlined some of the overall issues facing the community. He emphasized his view that the CANR (Chemically Assisted Nuclear Reaction) effects are due to active sites in cathode materials; they are not bulk effects. What is lacking, he says, is a physical specification for an active site—just as one might specify a transistor. The advent of technologies, such as Dr. Les Case's catalytic fusion, ratifies Dr. Glück's faith in his previously published ideas about cold fusion.

If timing does not create a conflict with the Eighth International Conference on Cold Fusion (ICCF-8), which is expected to occur next fall, readers of *Infinite Energy* are advised that we will try to have another Symposium in Manchester, New Hampshire roughly at the same time in 1999.

New Energy Times Archive

Aqueous Arc Experiment: Results Presentation

David Marett

26 Compton Crescent, Downsview, ON M3M 2C2 Canada

Paper delivered October 11, 1998 in Manchester, New Hampshire

The Ohmori-Mizuno experiment employed an arc-discharge in an aqueous salt solution to yield or capture excess energy in the form of heat. They also reported the transmutation of the constituent elements of the electrodes.

I undertook to repeat their experiment and determine whether or not the experimental evidence warrants their conclusion that their apparatus produces excess heat, independently of element transmutation.

Summary of Ohmori-Mizuno

The Ohmori-Mizuno apparatus consisted of a fused quartz vessel capped with a rubber stopper through which a cathode, anode and thermometer were placed. The cathode was a tungsten plate and the anode was a platinum gauze. They used a 0.5 M sodium sulfate solution or, alternatively, a 0.5 M potassium carbonate solution as their electrolyte. When the voltage between the electrodes was increased above 160 V, the cathode became incandescent followed by a marked reduction in the current consumption. The heat generated by the electrodes, as shown in their graph (Figure 1), indicates that there is excess heat production as compared to a heating element operated at the same power level. Subsequent analysis of the cathode revealed the presence of new elements, specifically iron and chromium.

Initial Investigation

I experimented with various electrode materials to determine which metals would function best as cathodes or anodes. I found that low work function materials such as aluminum and copper worked best as cathodes and high work function materials such as nickel, stainless steel or iron worked best as anodes. Tungsten worked well as a cathode when paired with nickel or steel or, alternatively, as an anode when paired with aluminum or copper due to its intermediate work function. This relationship of work function to electrode material was observed by the Correas - (contact author for Correa reference "Electromechanical Transduction of Plasma Pulses.")

Apparatus

For my experiments, I employed either a 1 L Pyrex beaker or a 500 ml Pyrex graduated cylinder. As an electrolyte, I used sodium carbonate, sodium sulfate and potassium chloride. The power supply, as shown in Figure 2, could provide up to 220 V at 2.5 A and was coupled to an RC circuit which smoothed the current spikes for accurate current measurements while providing an extremely low impedance to the electrodes . This circuit allowed the pulse current to be limited only by the conduction of the electrolyte. RMS current was measured using a Tektronix DMM 916 and voltage was measured using a Beckman DMM 3060. Temperature was measured using a mercury thermometer and a ceramic heater was used as the control heating element. In all experiments, the control heater power was adjusted every 30 seconds to exactly match the arc power. The cathode and anode electrodes were constructed from metal rods surrounded by hollow glass tubes which were sealed at the top but open at the bottom. This geometry allowed for the oxygen and hydrogen gas to be trapped around the electrodes, so that only the tips were exposed to the solution and the active parts of the electrodes could then be deep in the solution for efficient heat transfer. Magnetic stirring was employed in all experiments to homogenize the solution temperature.

Experiments

Now, looking at Figure 3, an experiment is shown with an aluminum cathode and a thoriated tungsten anode. The electrolyte is 700 ml of 0.5 M sodium carbonate in a 1 L uninsulated beaker. As you can see, the heating curve for the arc rises faster than does the control curve, indicating over-unity. The efficiency is about 142% and is similar to that found by Ohmori and Mizuno.

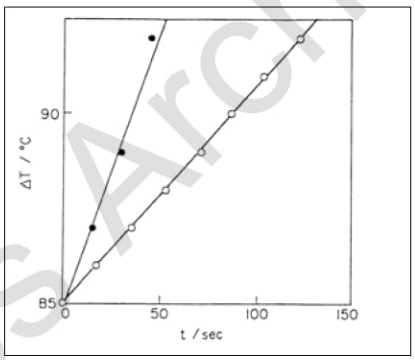


Figure 1. From Ohmori/Mizuno, *IE* #20 pg. 15.

In another experiment, shown in Figure 4, performed in an insulated graduated cylinder, an aluminum cathode was employed with a thoriated tungsten anode. 450 ml of 0.5 M sodium carbonate was used, which is 65% of the volume used in Figure 3 and three times the volume used by Ohmori and Mizuno. I first found confirmation of Ohmori and Mizuno during slope 1 but a knee in the curve was observed and led to slope 2 that rejoined the control slope C. Ohmori and Mizuno did not indicate what happened to their curve after the initial 50 seconds and so we are now left to wonder.

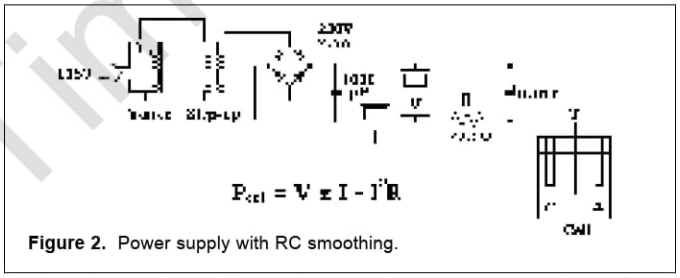


Figure 2. Power supply with RC smoothing.

Since large quantities of bubbles form during arcing, the density of the solution changes. This is likely to retain heat in the center of the solution and temporarily cause a higher temperature near the center where the thermometer is located. This transient dissipitive structure may be responsible for the initial rise and then fall in the rate of heating - see slopes 1 and 2.

In the Ohmori-Mizuno paper, the heater power is discussed as being 0.7 A at 160 V. I must assume that they set their power supply at this fixed level. From the power curve of Figure 4 (right ordinate), it is clear that the power of the arc begins higher and decreases with time by about 25% in this example. In all of my experiments, the arc power behaved in a similar way. If this is not taken into account, inaccuracies will develop. In similar experiments, I measured about 3 ml of lost solution from the arc run and about 3 ml of lost solution from the control run. It is interesting to note that there was no significant difference in solution loss between the experiment and the control.

In order to eliminate any uncertainty, an experiment was performed with a large solution volume with good insulation as shown in Figure 5. I used 775 ml of 0.5 M sodium carbonate in a 1 L beaker with one inch of foam insulation around, half an inch

New Energy Times Archive

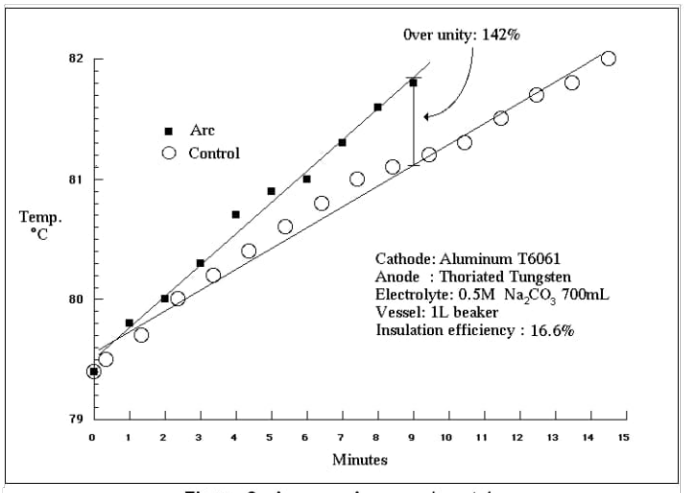


Figure 3. Aqueous Arc experiment 4.

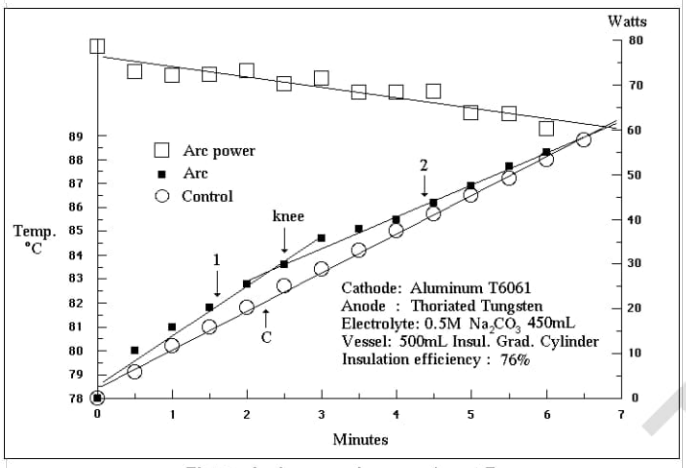


Figure 4. Aqueous Arc experiment 7.

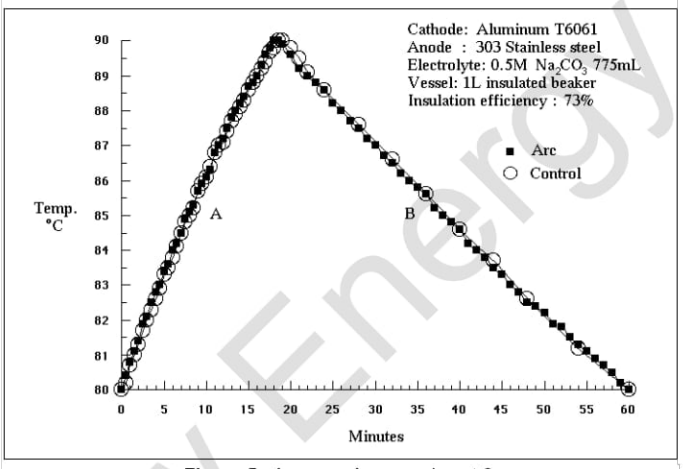


Figure 5. Aqueous Arc experiment 9.

on the bottom and 1/4 of an inch of polycarbonate above. Only a very small opening for gas escape was allowed. At no time was steam observed to exit from the vessel. The arc experiment was performed with an aluminum cathode and a stainless steel anode between 80 and 90 ° Celsius and the cooling of the vessel was plotted to confirm the heat capacity of the solution and vessel. The control heater was driven with the same power level as the arc, adjusting every 30 seconds to ensure accuracy. What I found was a heat production which was exactly matched by both the experimental and control curves. Once the vessel is adequately insulated, slopes 1 and 2 of Figure 4 disappear into a single slope "A." There is, therefore, no excess heat production in the Ohmori - Mizuno apparatus.

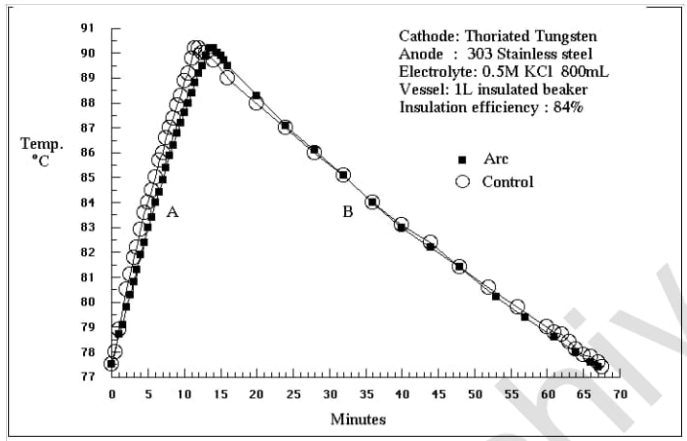


Figure 6. Aqueous Arc experiment 10.

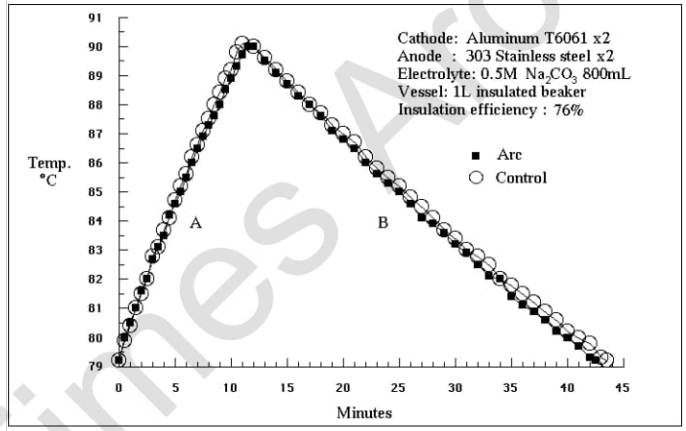


Figure 7. Aqueous Arc experiment 8.

To confirm that the cathode material and the chemistry of the solution are not significant factors, I reproduced the experiment with a thoriated tungsten cathode and a potassium salt electrolyte, 0.5 M potassium chloride. The results are shown in Figure 6 and, as you can see, are exactly the same as those in Figure 5.

Ohmori and Mizuno reported their findings for the first 50 seconds as being over-unity and in some of my initial experiments, the slope of the arc curve in the first minute was steepest. To rule out the effect of over-heating or conditioning of the electrodes with time, I performed an experiment using two sets of electrodes which were alternated every 12 seconds as shown in Figure 7. The results of this experiment only tend to confirm the conclusion that no excess heat is produced in the Ohmori/Mizuno apparatus.

Conclusions

Finally, I would like to address the main problems with the Ohmori-Mizuno experiment as they have been reported:

1. The absence of magnetic stirring introduces non-uniform heating and then the geometry of the electrodes in relation to the thermometer placement will affect the observed temperature rise.

2. Ohmori and Mizuno did not report collecting evaporated solution or solution loss, only temperature rise. Also, no one is reporting to have done a control with a heater, such as Ohmori and Mizuno did, for temperature rise nor have they tested evaporation of solution using a control heater. Therefore, one cannot conclude over-unity from evaporated solution without having done a heater control first. My own experiments demonstrate that there is no significant difference in solution loss between the experimental and control groups.

3. No one has reported using insulation in their experimental vessels. Ohmori and Mizuno's vessel only retained 26% of the heat generated. Mallove's reproduction appears to have only retained 43%. This means that most of the heat generated during the experiment and control was lost to the outside. This, in conjunction with no stirring, compels me to conclude that there was no excess heat generation.

New Energy Times Archive

The Quirks and Quarks of Physics and Physicists

Richard H.Wachsman
94 Rock Street, #9, Lowell, MA 01854-4332

I could not help but laugh after reading the article "Words to Eat. . ." in Issue 19 of *Infinite Energy*. The quote from University of Maryland physics professor Dr. Robert Park's column in *The Washington Post* of May 15, 1991 was especially funny. For those who missed it, he said, among other things, "To be sure, there are true believers among cold-fusion acolytes, just as there are sincere scientists who believe in psychokinesis, flying saucers, creationism, and the Chicago Cubs. The lesson from *Too Hot To Handle* is that a Ph.D. in science is not an inoculation against foolishness....or mendacity."

The reasons why this was so humorous would take several books to explain, but this article should give readers some highlights. I'll let Sammy Sosa and the Chicago Cubs speak for themselves. I'll also pass on the subjects of flying saucers and creationism, preferring to confine my remarks to physics, physicists, and cold fusion.

As one who left a Ph.D. program in physics at MIT in 1964, in part because I did not believe that the physics I was being taught was entirely correct, I can certainly agree with his remark about Ph.Ds in science, but not for the same reasons that Dr. Park had in mind.

Too many Ph.Ds seem more concerned with defending existing theories than with investigating new phenomena that might overturn them. Some Ph.Ds, not to mention a few publicity-seeking magicians and professional skeptics, go beyond the defense of current paradigms to attack not just the ideas of those who dare to research unexplained anomalies, but the researchers themselves. I call this phenomenon "psycho-antikinesis." Just as *psychokinesis* describes the use of the mind to move objects, psycho-antikinesis describes an obsessive compulsive disorder in some scientists, characterized by an almost psychotic desire to prevent what they see as objectionable research from moving forward.

The best way to turn this attitude around, I believe, is to cite some examples of scientists' incorrect ideas, and show how alternative ways of looking at things can open up new possibilities. Some errors that have been made in science were so fundamental on the one hand, and so asinine on the other, that anyone who persists in defending the resulting incorrect conclusions is, in my opinion, like the little terrapin with his head stuck inside his shell, totally blinded to reality. I'll even cite an example of my own such failure as a graduate student at MIT. I'll point out how Frank Close, author of *Too Hot To Handle*, failed to solve the solar neutrino mystery; how Dr. James Peebles, Albert Einstein Professor of Physics at Princeton, miscalculated the probability and possibilities of cold fusion; and how Richard Feynman, Nobel Prize-winning physicist and pioneer of quantum electrodynamics, missed solving turbulence and some other key problems in physics. If these examples still leave you in the dark, we'll put a new face on things, light a candle, and study the flame.

Physicists are Full of Quarks!

As a student at MIT from 1956 to 1964, I questioned many of the things I was taught. From inappropriate models and faulty assumptions to questionable approximations and incorrect calculations, not much escaped my critical eye. I won't go into all the details except to say that some classmates in one of my courses apparently took exception to my probing attitude (not to mention my occasional habit of skewing the grading curve by scoring too high on class quizzes).

When it came time for my nomination to various honor societies such as Sigma Xi, "devoted to the promotion of research in science," one classmate (I never learned who) tried to block my election by protesting that I asked "too damned many questions in class." Another of my classmates, who was already a member, put an end to that nonsense.

"It seems to me," he reminded them, "that asking questions is what research is all about."

How often we forget that very simple fact. I myself must plead guilty to having lost sight of it once. It was a lesson I never forgot, but it took many years before the lesson really sank in.

In a particle physics course in 1962, I learned that the magnetic moment of the neutron was negative. I was furious. The reason for my anger was two-fold. First, it meant that I had been victimized by a trick question on a modern physics final four years earlier. Second, no one else in our class, including the professor, seemed to understand the significance of the non-zero magnetic moment, or even that it was significant.

If the neutron is a fundamental point-particle (not composed of anything else), as was believed at the time, and has no electric charge, it should have no magnetic moment. Whereas in the past I only suspected that the physics I was being taught was...well, "suspect," here I *knew* something was definitely wrong.

My conclusion, unfortunately, concerned what I thought physicists were full of. The reason I say "unfortunately" is that they don't award Nobel Prizes for such observations, no matter how true they might later turn out to be. If only I had focused my attention on what neutrons might be full of! We were so used to thinking of the proton, neutron, and electron as fundamental particles, that we lost sight of the fact that this was only an assumption!

The irony of all this is that at the time I was a teaching assistant in Professor George Valley's Junior Physics Lab. (Readers may recall seeing him on the History Channel's "Modern Marvels" program on RADAR.) Assisting him as a faculty advisor was a young instructor named Jerome Friedman. If his name sounds familiar, it's because in 1990 he shared the Nobel Prize in physics with Henry Kendall of MIT and Richard Taylor of Stanford for a series of experiments they performed at SLAC, the Stanford Linear Accelerator. What they did was fire high energy electrons at a target of liquid hydrogen (and later deuterium) and scatter them off the tiny hard bits of matter inside the protons and neutrons which physicist Murray Gell-Mann had dubbed "quarks." These are fractionally-charged particles which come in three "colors" and six "flavors." The whole story may be found in Michael Riordan's book *The Hunting of the Quark*.

The proton and neutron are composed, in this scheme, of "up" quarks of charge +2/3 and "down" quarks of charge -1/3 (in units of the electron charge). The proton consists of two ups and one down for a net charge of +1, while the neutron consists of one up and two downs for a net charge of zero. The magnetic moment of the neutron is non-zero because it is composed of these electrically charged quarks.

So now we can truly say that life, like physics, has its ups and

New Energy Times Archive

downs, and "physicists are full of quarks!"

Frank Close's WIMPy Idea

One physicist who wasn't quite clear about what physicists might be full of was Frank Close, who, as a graduate student, may have thought that quarks were "too hot to handle." (See Chapter 8 of Riordan's book.) As we'll see, it's not the only thing he missed, and I'm not even referring to cold fusion.

Close, in his book *Apocalypse When: Cosmic Catastrophe and the Fate of the Universe* also found the core of the Sun "too hot to handle" the solar neutrino mystery. You see, too few neutrinos seemed to be emerging from the Sun. He mentioned that the fusion reactions occurring at the core of the Sun, and hence the rate of neutrino production, were critically dependent on the temperature of the core, the neutrino flux varying as the temperature raised to the 10th power. If something could cool the core of the Sun, even slightly, it might account for the reduced neutrino flux, at least in part, since recent experiments seem to indicate that neutrinos have mass and as such can change their "flavor" on their journey from the Sun to the neutrino detectors here on Earth. This must also be taken into account in resolving the solar neutrino mystery.

In any case, an idea that had been advanced by physicists to help resolve the problem of the "missing mass of the universe" was the existence of one or more particles known as WIMPs, or Weakly Interacting Massive Particles. Close indicated that a sufficient number of these WIMP particles, having masses between 5 and 20 proton masses, might enter the Sun, and be just what was needed to effect the necessary core cooling. Less than 5 proton masses, and the WIMPs wouldn't make it to the core. More than 20 proton masses and the WIMPs wouldn't gain enough energy in collisions with the hot protons in the core to lower the core temperature sufficiently for the WIMP idea to work.

Now, in an earlier chapter, Close talked about the possibility of comets colliding with the Earth and causing the end of life on Earth. He mentioned also that comets known as "sungrazers" were observed passing very close to the Sun, and that one was even seen entering the Sun. (The October 1998 issue of *Popular Science* on page 25 shows a picture taken by SOHO of two such comets plunging into the Sun's atmosphere.) Since comets are believed to consist of methane, ammonia, and water, whose carbon, nitrogen, and oxygen atoms lie right in that 5 to 20 proton mass range, it seems to me that comets entering or grazing the sun would be much more likely candidates for the source of the particles necessary to cool the core than the hypothetical WIMPs. This is especially so when other unexplained phenomena associated with the Sun are considered. These include sunspot activity with a periodicity close to that of Jupiter's orbital period, solar "ringing" or "sunquakes," and the high temperature of the Sun's corona. The recent discovery of hot water vapor in the Sun's atmosphere lends additional credence to the comet idea. To this humble writer, it looks like an "outside job."

These sungrazing comets would likely be small enough to have been missed by astronomers but large enough to have not burned up before reaching the Sun. This idea also puts Dr. Louis Frank's small comet idea, as outlined in his book *The Big Splash* and in the October 1998 issue of *Astronomy* magazine, in a new perspective.

Jim Peebles' Computational Con-fusion

Another author who may want to consider revising one of his books is Dr. P.J.E. Peebles, noted cosmologist and author of the book *Quantum Mechanics*. In Chapter 1, Section 9 of that book, titled "Cold Fusion," Peebles described what he referred to as "an interesting grown-up computation." This involved an estimate of the probability of the two deuterons in a deuterium molecule approaching close enough for the possibility of a fusion reaction to occur. To do this he considered an isolated deuterium molecule in the ground state. Now the adult in me wants to say, "Nice calculation, Dr. Peebles." But the kid in me wants to say, "Why are you doing the calculation for an isolated deuterium molecule in the ground state? Why not at least consider a deuterium molecule in a highly excited vibrational state?"

While I am not a probability calculator like Dr. Peebles, I am a possibility thinker. If you want to consider cold fusion (or any other anomaly for that matter) you need to consider all the possible ways that the probability of fusion (or other anomaly) could be enhanced (or occur) and not just the one thing you happen to consider simply because it's relatively easy to calculate.

Good, Good, Good Vibrations

In a highly excited vibrational state the deuterons not only 1) approach more closely than in the ground state, but 2) they do so repeatedly, resulting in a dramatic increase in the probability of fusion on both counts. If we also consider that 3) the deuterons in a vibrating molecule approach each other head on, and 4) also linger longer at this closer distance than would be the case for hot fusion, it is easy to see that this also dramatically enhances the probability of fusion in accordance with the Lawson criterion. Finally, as the Lawson criterion also reminds us, 5) a high density of deuterons also enhances the probability of more fusion reactions. Deuterons crammed into a palladium lattice have a density that would seem to be higher than in the plasma state that exists in a man-made hot fusion reactor. Needless to say, it is also necessary to consider 6) the effects of the free electrons in the palladium as well as 7) the possibility of electron capture by one of the deuterons with the subsequent emission of a high energy beta decay electron.

Now one might ask how the deuterium molecules get into a highly excited vibrational state when a) the temperature required to achieve this by thermal means greatly exceeds the melting point of the palladium lattice, and b) the deuterons in the palladium are not even in the molecular state. Again, as possibility thinkers, we say that the deuterium molecules are not excited to highly energetic vibration states but rather are formed in these states. This could come about because an energetic particle could collide with the deuterons in the palladium and they in turn could give up the excess energies in a series of collisions with other deuterons until, finally, when the deuterons collide, their energies are low enough to bind into molecules in highly excited molecular vibrational states. Before discussing where the initial high energy particles might come from (other than from cosmic rays), let's see why we could have fusions without the large numbers of neutrons that some claim must be produced when fusion occurs.

Yes, We Have No Neutrons!

If a vibrating deuterium molecule smashes into a palladium atom in the lattice, the translational energy of the molecule is transferred to the "vibration," allowing the deuterons to approach even closer (for one time). This assumes that the extra energy causes the deuterium molecule no longer to be in the bound state, so that the deuterons could in fact approach even closer, taking on virtually any energy that the conservation of energy allows. If a fusion occurs at this time, some of the excess energy produced can be taken up by the lattice with a helium-4 nucleus being produced and taking up the remaining energy.

New Energy Times Archive

Let's examine another possibility. As the deuterium molecules vibrate, the deuterons will have the opportunity to orient so that they approach each other neutron-to-neutron. This favors the fusion reaction, which produces a proton and a tritium nucleus rather than a neutron and a helium-3 nucleus. Also, the neutron spins of the deuterons would have time to orient in such a way as to enhance the probability of fusion. An extra magnetic attraction force brought about by the orientation of the quarks in the neutrons could help lower the effective energy barrier slightly, thereby increasing the tunneling probability.

These energetic fusion products can also produce other vibrating deuterium molecules, if the palladium lattice is large enough to allow this to happen before these fusion products escape from the crystal. The fusions would be self-sustaining in that case, accounting for the "heat after death" effect, which is the continuing production of heat in the palladium after the cell voltage (and therefore current) is turned off.

If scientists would stop automatically thinking of things such as the lack of neutrons as a reason why cold fusion cannot occur, but instead consider clues as to how it can occur, they might make more progress in their investigations of nature's mysteries.

Is Cold Fusion on Lithium?

If the initial energetic particle came solely from a cosmic ray, then the cold fusion reactions would not be so dependent on the current and voltage of the Pons-Fleischmann cell, never mind on the presence of lithium deuteride in the heavy water in the Pons-Fleischmann cell.

It is evident that if deuterium molecules are going to form in the palladium as described above, then the palladium has to be loaded with deuterons, especially near the surface. This means that the cell would have to be operating for a sufficiently long time for this loading to occur. For this to happen efficiently might also mean that the cell voltage and current would have to be within a certain range.

As for the lithium, its small mass may be the key to understanding its role (although its direct participation in a nuclear interaction must also be considered). The lithium ions should move through the heavy water more rapidly than heavier ions such as sodium or potassium, especially under the influence of the cell voltage. As such they should not have as many heavy water molecules clinging to them as they move as would be the case for heavier ions. Therefore, the total mass of the ion plus its heavy water shroud will be less than for a heavier ion. This means that the more rapidly moving lithium ion with its associated heavy water shroud should be able to create more deuterium ions for the palladium to absorb than would be the case for a heavier ion.

Now let us imagine a lithium ion, with two heavy water molecules clinging to it, one at the front and the other at the rear as it moves toward the palladium electrode under the influence of the cell voltage. If a bond-bending vibration of the heavy water molecule at the front of the ion is excited by a molecular collision, a fusion might occur and produce a proton and a tritium nucleus with one or the other entering the palladium lattice. For this to happen, the fusion would have to take place right near the palladium surface. This fact, plus the fact that the bond-bending vibration of the heavy water molecule requires a certain minimum energy to initiate, means that the cell voltage would have to be within a certain range. This fusion at the surface of the palladium would be the source of the high energy particle. Since just one of these particles entering the palladium could produce many fusions, the probability of this fusion occurring does not have to be as high as the probability of fusion occurring inside the palladium.

Of course, this discussion does not prove that this is exactly what is happening with cold fusion. Rather, it is intended to suggest some plausible explanations. If all one does is perform "knee jerk" computations on whatever happens to occur to them, without exploring any other possibilities, we may reach incorrect conclusions that preclude further investigation.

Even Geniuses Make "Misteaks"

When one hears the word "genius," one often thinks of Albert Einstein. To indicate that physicist Richard Feynman is considered by many of his peers to be in that category, James Gleick, author of *Chaos: The Making of a New Science*, titled his book on Feynman *Genius: The Life and Science of Richard Feynman*. Likewise, when PBS decided to do a NOVA program on Feynman, they called it "The Best Mind Since Einstein."

Yet, even Richard Feynman, as "curious a character" as he claimed to be, was unable to bring himself to accept the existence of flying saucers, antigravity, ESP, and other such possibilities, even though he himself had experienced an out-of-body episode in a sensory deprivation tank. Possibly it never occurred to him that there might be a connection between "the physics of the unexplained" and "the unexplained of physics." According to the NOVA program, he seemed to be more interested in debunking questionable unexplained phenomenon than in investigating them. In any case, let's take a closer look.

Unsolved physics problems that Feynman tried unsuccessfully to understand include 1) fluid turbulence, 2) fire, 3) magnetic attraction, 4) gravitational attraction, 5) inertia, 6) superconductivity, 7) triboluminescence, 8) quantum mechanics, and 9) the Pauli Exclusion Principle, including the relation between spin and statistics. While he was unable to solve these problems, at least he was able to recognize, to his great credit, that some of them were, in fact, not really understood.

Unfortunately, Feynman not only gave up trying to understand what may underlie quantum mechanics, but he also urged others to avoid "asking how it can be like that." He added, "Nobody knows how it can be like that." By the time I learned of his remarks, I had been asking that for about 35 years. I had made some progress, but it took a few more years before the breakthrough occurred. Of course, if you don't ask, you don't receive, whether it's an order in a sales situation or an answer to an unsolved problem in physics.

Turbulent Waters

In 1951 Feynman wrote, "The world cannot be half quantum mechanical, half classical." Yet he also called turbulence "the most important unsolved problem of classical physics." Was he correct?

A cover story on turbulence in the January 1997 issue of *Scientific American* quoted one physicist as declaring that when he got to heaven, "There are two matters on which I hope for enlightenment. One is quantum electrodynamics, and the other is the turbulent motion of fluids." About the former, he was rather optimistic.

A virtually identical quote was cited in Gleick's book, *Chaos*, except that the scientist was Heisenberg, and the other matter on which he wanted enlightenment was Einstein's theory of relativity. In any case, turbulence is not considered by science to be just another item in a long list of unsolved physics problems.

In fact, understanding what underlies turbulence will be shown to provide the key to understanding a wide range of unexplained phenomena and it illustrates the major mistake made by many physicists. To understand this, let's sit in on a fluid mechanics class at MIT as described by Pepper White in

New Energy Times Archive

his book *The Idea Factory: Learning To Think At MIT*.

He Didn't Want to Miss a Thing

On the first day of class, Professor Shapiro of MIT's department of mechanical engineering was explaining Euler's continuum model of fluids. White recounted how he didn't want to miss a thing. He didn't catch Euler's name, and he described in his book how he debated about whether to raise his hand now in order to ask the name or wait until the end of class. He then added, "It would be nice if I knew what he meant by a model."

In that one comment, we have, in summary, what is wrong with physics. Too many physicists have lost sight of the fact that they are dealing with *models* of physical reality, models which they hope will be sufficiently complete and accurate to capture the essence of the physical situation that they wish to study, while still being sufficiently simple to be amenable to mathematical analysis. They must be reminded from time to time that the equations which emerge from their often oversimplified models and calculations are not laws of physics, but rather relationships that hold only insofar as the models, assumptions, and mathematical approximations utilized in developing them are valid. It is often all too easy to overlook an important aspect of a problem.

When I was introduced to Euler's continuum model of fluids in the spring of my freshman year, there was no debate. My hand shot right up, not to catch Euler's name, but to challenge the very validity of the model. For those who may not recall exactly what is involved, the continuum model neglects the molecular nature of the fluid in favor of a description of the behavior of macroscopic variables such as pressure, density, and fluid velocity as a function of time and position in the fluid. I remember thinking to myself, "God did not make molecules for physicists to ignore." Some day, I felt, a phenomenon will emerge that science will be at a total loss to explain because of the failure or inappropriateness of that continuum model. At the time I did not know that one such phenomenon would be fluid turbulence. It was not the only one.

The Onset of Turbulence

As a fluid such as air or water flows past a smooth boundary at a sufficiently slow speed, the flow is laminar, involving a regular and essentially repeatable pattern. As the flow rate increases, however, a critical value is reached where semicoherent molecular rotations are excited and the flow becomes turbulent, chaotic, irregular, and unpredictable.

Now a rotating molecule is a rotating electric charge distribution, and a rotating charge distribution can produce a magnetic field even if the net charge of the molecule is zero (remember the neutron). These are long-range forces and they negate the validity of Euler's continuum model, which implicitly assumes that the intermolecular forces are short-range nearest-neighbor collision forces which permit conditions of near equilibrium to exist among the vast number of molecules assumed to be contained within the infinitesimal volume elements of the fluid. This assumption means that the use of macroscopic variables is valid and that these variables may be treated as continuous and continuously differentiable, so that the calculus can be utilized to describe their behavior. This is no longer true, however, when the intermolecular forces range, not just to nearest neighbors, but across the tiny volume elements (and maybe further). As if this were not bad enough, the problem of molecular rotation is not even one of classical physics, but of quantum mechanics. Feynman and Heisenberg were not the only Nobel prize-winning physicists who totally missed this; so too did the great Russian physicist Lev Landau, whose theory on the onset of turbulence is described by Gleick in his book *Chaos*. Ironically, all three physicists were major contributors to quantum mechanics.

You Can Lead a Physicist to Water...

While I cannot go into all the details here, among the many phenomena which I believe have at their root an explanation directly (or indirectly) related to the magnetic coupling of rotating molecules, particularly water molecules, are: 1) fire, 2) triboluminescence, 3) sonoluminescence, 4) Brown's gas, 5) ball lightning, 6) the aura, 7) acupuncture, 8) the "Bermuda Triangle," 9) sprites and blue jets, 10) "polywater," 11) earthquake lights, 12) tornadoes, 13) magnetic therapy, 14) therapeutic touch, 15) levitation, 16) fish and frog falls, 17) magnetic water and fuel treatment, 18) superconductivity, 19) the Pauli Exclusion Principle, 20) magnetic attraction, 21) cold fusion, and, yes, 22) psychokinesis.

Putting a New Face on Things

The late Carl Sagan was a great popularizer of science whose "Cosmos" series on PBS and various books did much to generate public interest in science and astronomy. Unfortunately, his attitude toward unexplained phenomena sometimes seemed that of a knee jerk debunker rather than a thoughtful investigator, particularly when it came to the apparent anomalies in the Cydonia region of Mars. This area includes a mesa which bears a strong resemblance to a human face, according to many who have done extensive studies of two photographs taken by the Mars Viking mission in 1976.

When I first saw Richard Hoagland's book on the subject, *The Monuments of Mars: A City on the Edge of Forever*, in a bookstore, my first reaction was, "Give me a break! How gullible do they think we are?" But, after leafing through it, curiosity got the better of me and I bought and read the book. By the time I was done, I was impressed by both the investigatory approach and the careful arguments laid forth by the author, a science writer with no agenda other than to seek out the truth. Unfortunately, many scientists never get past "Give me a break!"

In his book *Demon Haunted World*, Sagan at least acknowledged, after many years, that the Cydonia region might be worth re-photographing if only to settle the issue of the Face once and for all. While NASA did this in April 1998 with the Mars Global Surveyor, the results are still inconclusive. From what I have seen, it seems to me that NASA may have photographed the wrong mesa, but the jury is still out on this.

Science as a Candle in the Dark

The subtitle of "Demon Haunted World" is "Science as a Candle in the Dark." What is amusing about this is that if you light a candle, you observe a phenomenon that science has been unable to explain, namely fire. It is such a common phenomenon that we take for granted that science must understand it, but this is not the case. As Richard Feynman put it, "What agitation of atoms engenders fire?"

Now, if he had added "or molecules," he might have made progress, but the colors of the flame, lying as they do in the visible portion of the electromagnetic spectrum, are normally associated with electron transitions in atoms. However, the orange, blue, and violet of the flame are associated with the bond-bending vibration spectra of light water, heavy water, and the hybrid water molecule (where one of the hydrogens is a proton and the other a deuteron). The water of which the flame is composed is a product of combustion, along with carbon dioxide. The details are somewhat complicated and will be covered in detail in my future book. The impor-

Wachsman continues on page 62

New Energy Times Archive

NEW ENERGY UPCOMING EVENTS

Space Technology & Applications International Forum (STAIF-99), January 31 - February 4, 1999

Breakthrough Propulsion Physics sessions in the Conference on Applications of Thermophysics in Microgravity and Breakthrough Propulsion Physics, will be held as part of the Space Technology & Applications International Forum (STAIF-99), January 31-February 4, 1999, in Albuquerque, NM. The website for more information is http://www-chne.unm. edu/isnps/isnps.htm. The abstract contributors should E-mail or call the author when an abstract is sent so we can be looking for it.

C9. EMERGING PHYSICS TOWARD PROPELLANTLESS PROPULSION — Alan Holt, Chair 281-244-8394, al.holt1@jsc.nasa.gov
C10. EMERGING PHYSICS TOWARD HYPER-FAST SPACE TRAVEL — Catherine Asaro, Chair 410-715-1703, asaro@sff.net
C11. EMERGING PHYSICS TOWARD BREAKTHROUGH SPACECRAFT POWER — Dave Goodwin, Chair, 301-903-6474, dave.goodwin@oer.doe.gov

. . .Physicists such as H. Feshbach of the Massachusetts Institute of Technology have abused the authority of their institutions and gone to the extreme of public appearances on ABC television and in the newsmedia to disclaim and disqualify the possible presence of stimulated nuclear transmutations in the emerging new energies prior to any systematic experimental study — R.M.

21st CENTURY
SCIENCE & TECHNOLOGY
Fall 1998 Features:

- Should the Laws of Gravitation Be Reconsidered? *by Maurice Allais*
- Alexander Gurwitsch and the Concept of the Biological Field *by Michael Lipkind*
- The Reciprocity of Extremes: The Astrophysics of Gurwitsch Radiation *by Lyndon H. LaRouche, Jr.*
- Spiral Eddies: The Discovery That Changed the Face of the Ocean *by Robert E. Stevenson*

Subscribe!
$25 for 6 issues (U.S.)
$50 for 6 issues (foreign)
Single copies $5 ($6 foreign)
Send check or money order (U.S. currency only) to 21st Century, P.O. Box 16285 Washington, D.C. 20041

SUSTAIN '99
THE WORLD SUSTAINABLE ENERGY FAIR
May 25-27, 1999
AMSTERDAM RAI

Ph: 31(0)20 549 12 12;
Fx: 31(0)20 644 50 59
http://www.rai.nl press@rai.nl

P.O. Box 77777, NL-1070 MS
Amsterdam, Europaplein

Second International Symposium on Consciousness, New Medicine and New Energy
November 26-27, 1998
Ibuka Hall, Waseda University, Tokyo, Japan
Contact: Mr. Hideo Hirano: Tel/Fax: 0426-65-9371

Advertise Your Upcoming New Energy Event
Call *Infinite Energy* Magazine for details. (603-228-4516)

CALENDAR

Past, Present and Future

ICCF7—Seventh International Conference on Cold Fusion
April 19-24, 1998
Vancouver, Canada

Special Sessions and **Workshop on Low Energy Nuclear Reactions** at the ANS Annual Meeting
June 8-11, 1998
Nashville, Tennessee

Russian Conference "Fundamentals of Natural Sciences"
June 22 - 27, 1998
St. Petersburg, Russia

33rd Intersociety Energy Conversion Engineering Conference (IECEC)
August 2-6, 1998
Colorado Springs, CO

Institute for New Energy (INE) Symposium
August 14-15, 1998
University of Utah
Salt Lake City, UT

International Tesla Society Meeting
September 4-6, 1998
Colorado Springs, CO

Sixth Russian Conference on Cold Nuclear Transmutation
September 28-October 5, 1998
Dagomys, Russia

Infinite Energy Magazine's **Cold Fusion and New Energy Symposium 1998**
October 11, 1998
Manchester, New Hampshire

Second International Symposium on Consciousness, New Medicine and New Energy
November 26-27, 1998
Waseda University
Tokyo, Japan

ICCF-8, Eigth International Conference on Cold Fusion
Fall, 1999 in Italy
(Exact location pending)

The World Sustainable Energy Fair
May 25-27, 1999
Amsterdam RAI

New Energy Times Archive

Subscribe to *Explore! for the Professional* to acquire the latest research of

T.E. Bearden
P. Tewari
Robert Beck
G. Belovari

and other cutting edge researchers interested in Alternative Energy and Energy Medicine.

Contact us at:

Explore Publications, Inc.
Post Office Box 1508
Mt. Vernon, WA 98273

sample issue $7.50 (US)

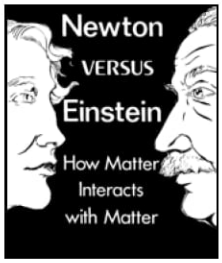
back issues ARE available

credit card orders accepted at 1-800-845-7866 or

visit our website at:
www.explorepub.com

NEWTON versus EINSTEIN

by Drs. Peter and Neal Graneau
Hardcover, 219 pages
Only $19.95 (in North America)
$26.95 (all other foreign)
(includes First Class/Airmail shipping)



"An absolute MUST read..."
E. Mallove

Cold Fusion Technology, Inc.
P.O. Box 2816
Concord, NH 03302-2816

... THE REVOLUTION IS COMING!

The Coming Energy Revolution

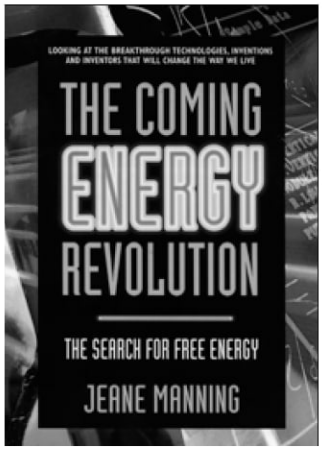
by Jeane Manning

1996, published by Avery Publishing Group, Garden City Park, New York
230 pages, illus., resource list, glossary, indexed, ISBN 0-89529-713-2.

$15.95 (US AND CANADA)
$22.95 (OTHER FOREIGN)
(Includes First Class/Airmail Shipping)

NOW AVAILABLE FROM

COLD FUSION TECHNOLOGY
P.O. BOX 2816
CONCORD, NH 03302
Phone: 603-228-4516
Fax: 603-224-5975



Electric Spacecraft Journal Network

Keeping you informed about independent research...

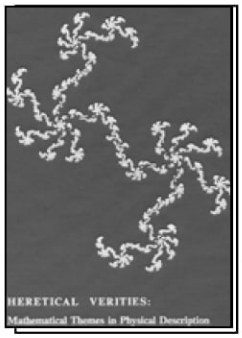
The ESJ Network assists individual research efforts, facilitates cooperation among experimenters and provides an open forum for the exchange of information and ideas. The Network provides a medium for direct interaction among associates. We urge individuals doing independent research to network.

The Network welcomes those engaged in experiments, analysis, conceptual thinking, and investigative research, who are willing to interact with others. Inquiries to: 704-683-0313 or 704-683-1280, Fax: 704-683-3511

Subscriptions to the quarterly *Electric Spacecraft Journal*, 73 Sunlight Drive, Leicester, NC 28748 USA. Annual Subscription rates: U.S.A. $24; Canada and Mexico $29; Overseas $39.

HERETICAL VERITIES

Mathematical Themes in Physical Description



$45.00 North America
$60.00 Foreign

Order from:
Cold Fusion Technology, Inc.

*See IE issue #17 for book review.

New Energy Times Archive

1996 COLD FUSION & NEW ENERGY SYMPOSIUM
(at the Cambridge Marriott, 1/20/96)

VIDEO TAPES **(7 hours of *ESSENTIAL* viewing!)**

On the four VHS tapes...

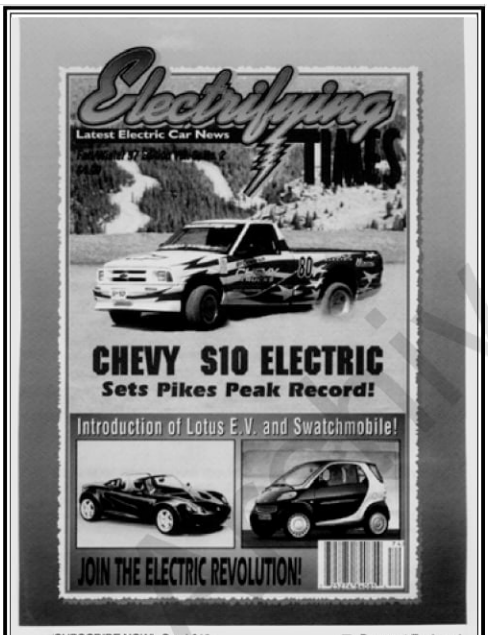
- **Dr. Eugene F. Mallove**
- **Jed Rothwell**
- **Dr. Mitchell Swartz**
- **Dr. Dennis Cravens**
- **Dr. James Patterson**
- **James Griggs**
- **Hal Fox**
- **Prof. Keith Johnson**
- **Chris Tinsley**
- **Dr. Paul LaViolette**
- **Dr. Hal Puthoff**
- **Japanese Magnetic Motor Researchers**

You must order these tapes...

if you want the best up-to-date overview of cold fusion and new energy by leading researchers and people in the know.

Including views of the **Power-Gen 95 CETI Patterson Power Cell** demo equipment, magnetic motors, video clips of the "Cincinnati Group's" experiments, operation of the **Hydrosonic Pump™**, video footage of **Yusmar** devices in Moldova, etc.

ONLY $99.95 (U.S. & Canada)
($124.95, other foreign, includes air-mailing)
Cold Fusion Technology, P.O. Box 2816
Concord, NH 03302-2816
Phone: 603-228-4516; Fax: 603-224-5975



SUBSCRIBE NOW! Send $12. ☐ Payment Enclosed

ELECTRIFYING TIMES
63600 Deschutes Market Road
Bend, Oregon 97701
541/388-1908, FAX 541/388-2750
etimes@teleport.com
http://www.teleport.com/~etimes

COLD FUSION *Infinite Energy* **NOW!**
GET THE FACTS: INFINITE ENERGY MAGAZINE, P.O. BOX 2816, CONCORD, NH 03302 — USA

Get Your *Infinite Energy* Cold Fusion Vinyl Bumper Sticker(s) Today!

Actual Size: 3 in. x 12 in.
(7.6 cm x 30.5 cm)

	U.S. and Canada	Other Foreign
1 Sticker	$ 5.00	$6.00
5 Stickers	$20.00	$24.00

ORDER FROM:
Cold Fusion Technology
P.O. Box 2816
Concord, NH 03302-2816

EXOTIC RESEARCH Report

21st Century Energy Technology
Alternative Medicine
Latest Inventions

U.S. $30
Can/Mex. $35.
Foreign: $55.

Exotic Research
P.O. Box 411
Stanfield, AZ
85272

1-800-417-6399

COLD FUSION TIMES

The Journal of the Scientific Aspects of Loading Isotopic Fuels Into Materials

Published Quarterly
Publisher and Editor, Dr. Mitchell Swartz
Annual subscription rate is $120.00. Single issues are $40.00. Outside U.S. extra $5.00 postage/handling
P.O. Box 81135
Wellesley Hills, MA 02181 USA

T H E M A G A Z I N E F O R I D E A P E O P L E

www.inventorsdigest.com
Inventors' DIGEST

Call today and take advantage of our no-risk subscription deal! We'll send you your first issue, and if *Inventors' Digest* is not what you need, just cancel your subscription. One yr. subscription: $22/U.S. $27/Can. $40/Overseas (U.S funds)

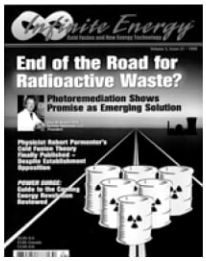
"In one issue of *Inventors' Digest*, I gained more knowledge about inventing pitfalls, marketing, patent searches, etc. than from all the other [business] magazines put together!" *- a new subscriber to ID*

1-800-838-8808

Inventors' Digest, 310 Franklin St., #24, Boston, MA 02110

YOUR AD COULD BE IN THIS SPACE.

CALL OR WRITE FOR A MEDIA KIT TODAY!



COLD FUSION TECHNOLOGY, INC.
P.O. Box 2816
Concord, NH 03302-2816
Phone: 603-228-4516; Fax: 603-224-5975

New Energy Times Archive

Wired Magazine's Exposé of the Cold Fusion Scandal

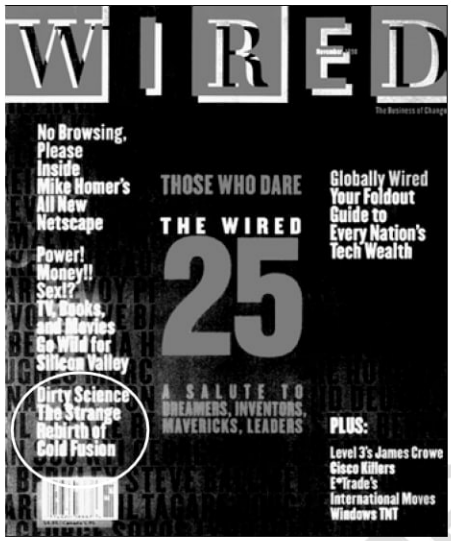
Wired Magazine, the funky, colorful, high-tech journal of the digital age, took a giant leap forward for truth in science journalism with its latest issue. Charles Platt's 18-page exposé feature article in the November 1998 *Wired*, "Dirty Science: The Strange Rebirth of Cold Fusion," makes it abundantly clear that the world very likely is facing an energy and scientific revolution of unprecedented scale. The article is cited on the cover of the magazine. The circulation of *Wired* exceeds 500,000, with a monthly print run of some 700,000.

Infinite Energy magazine initiated Platt's interest in the subject, as he recounts. He writes: "Today, a handful of laboratories still pursue cold fusion, but their work remains largely ignored. I knew nothing about it myself until Eugene Mallove, the former science writer from MIT, sent me a copy of a book he had written titled, *Fire from Ice*, which provided an excellent factual summary."

Platt also identifies one of the key problems for cold fusion, which is not the lack of results or significant publication, but the refusal of key opinion-molding science journals to publish scientific papers with rock-solid findings that are at odds with supposedly bullet-proof theories of modern physics and chemistry.

Platt faults science journalist Gary Taubes, who assaulted the reputations of scientists at Texas A&M University in 1990, and later in his negative book, with what quickly proved to be totally false allegations of fraud. Platt discusses the work of scientists at Los Alamos National Laboratory and elsewhere that refute the allegations. When asked, Platt told *Infinite Energy* magazine that Taubes did not want his comments to Platt to be published—so they weren't. Professor John O'M. Bockris' comments and those of Nigel Packham, the aggrieved parties, were.

Infinite Energy Magazine is proud to have contributed to one of the best single journalistic accounts on the cold fusion scandal since the famous Fleischmann and Pons press conference at the University of Utah on March 23, 1989. *Infinite Energy* encouraged author Charles Platt to explore cold fusion and draw his own conclusions, and he did. Platt writes: "At most, the story of cold fusion represents a colossal conspiracy of denial. At least, it is one of the strangest untold stories in 20th-century science." Of course, *Infinite Energy* magazine agrees with the first possibility, but readers of Platt's seminal investigative report can decide for themselves.



To investigate the cold fusion scandal, Platt traveled to cold fusion companies and interviewed some of the hundreds of scientists who work in this field as heroes unsung by the general media, such as *The New York Times*—which continues to act as though cold fusion science and technology do not exist. Platt attended the Seventh International Conference on Cold Fusion in Vancouver, British Columbia in April 1998 to see for himself whether cold fusion evidence is real, or whether hundreds of scientists are engaged in mass-delusion. It is unfortunate that other science journalists did not attend ICCF-7, preferring as they do to follow the path of least resistance, which is to say—to do nothing. Perhaps after reading the exposé by Charles Platt, they will have second thoughts. Just don't hold your breath!

Infinite Energy readers are urged to get the November 1998 *Wired*, which could become a collector's item. Spread the word: Cold Fusion is hot, it's *wired*.

Back in New Hampshire, the always informative *New Hampshire Editions* magazine, edited by Rick Broussard, ran a profile of the *Wired* article in its *NH Guide to the Internet & Technology* section. Broussard interviewed Platt, who said: "Like all marginalized activities, cold fusion contains a rich mixture of people. If you went into any small subculture you'd find extremes from total cranks to very smart people with more imagination than most. Gene [Mallove] chooses to be open to both extremes. Sometimes a new field of endeavor needs an extremist. Maybe he's the right extremist for the job. . . he's done something which most people would have thought impossible. Starting this magazine skating on the fringes of science, getting money to run it and a lab to test ideas. It's a bootstrap operation that's quite impressive regardless of the results—never underestimate the power of obsession."

Space Technology and Applications International Forum (STAIF-99)

The Breakthrough Propulsion Physics sessions in the Conference on Applications of Thermophysics in Microgravity and Breakthrough Propulsion Physics will be held as part of the Space Technology and Applications International Forum (STAIF-99), January 31—February 4, 1999, in Albuquerque, New Mexico. The website for more information is: http://www-chne.unm.edu/isnps/ isnps.htm.

The abstract contributors should E-mail or call the author when an abstract is sent so we can be looking for it. Thanks. —Al Holt

C9. EMERGING PHYSICS TOWARD PROPELLANTLESS PROPULSION

ALAN HOLT, Chair, NASA Johnson Space Center, Code OZ4, 2101 NASA Road., Houston, TX 77058-3696, 281-244-8394, 713-606-3521 (voicemail/pager) Fax: 281-244-8292, al.holt1@jsc.nasa.gov

DANIEL C. COLE, Co-Chair IBM Microelectronics, MS: 972F, Essex Junction, VT 05452, 802-244-8394, Fax: 244-8292 al.holt1@jsc.nasa.gov

Papers are invited that present theories, experiments, or empirical evidence that describe research directions or specific approaches for the development of a capability to propel a vehicle in transatmospheric, near-earth space and deep space regions, without the use of rockets or beamed power. These capabilities include applications of: (1) fundamental physics of forces and acceleration, addressing enhanced coupling between inertia, gravity, electromagnetism, inertial frames and/or space-time; (2) fundamental physics of motion through space-time or the motion of perturbations of space-time; and (3) fundamental physics of energy exchange mechanisms. Papers are also invited which (4) describe and compare competing theories or empirical evidence, with special emphasis to their potential for achieving a propulsion breakthrough, and which (5) address the use of microgravity research and technology testbeds associated with the International Space Station, Station-based and other free-flyers and earth-to-orbit vehicles.

New Energy Times Archive

C10. EMERGING PHYSICS TOWARD HYPER-FAST SPACE TRAVEL

CATHERINE ASARO, Chair, Molecudyne Research, 10420 Blue Arrow Court Columbia, MD 21044 , 410-715-1703, Fax: 410-286-0256, asaro@sff.net

CLAUDIO MACCONE, Co-Chair Alenia Spazio Via Martorelli, 43, Torino, Italy I-10155 39-1171-80313, Fax: 39-1171-80012, cmaccone@to.alespazio.it

Papers are invited that present theories, proposed experiments, or empirical evidence that are aimed at addressing how to attain the maximum transit speeds physically achievable. This includes: (1) fundamental physics of forces and acceleration; (2) fundamental physics of motion through spacetime or the motion of perturbations of space-time; and (3) fundamental physics of energy exchange mechanisms. Papers are also invited which (4) describe and compare competing theories or empirical evidence with special emphasis to their potential for achieving such a propulsion breakthrough.

C11. EMERGING PHYSICS TOWARD BREAKTHROUGH SPACECRAFT POWER

DAVE GOODWIN, Chair U.S. Department of Energy, Office of High Energy & Nuclear Physics, ER-20 19901, Germantown, Germantown, MD 20874 301-903-6474, Fax: 301-903-5079, dave.goodwin @oer.doe.gov

F. MICHAEL SERRY, Co-Chair Digital Instruments Inc., 112 Robin Hill Road, Santa Barbara, CA 93117, 805-967-1400/ 248, Fax: 805-967-7717, serry@ di.com

Papers are invited that present theories, proposed experiments, or empirical evidence that are aimed at addressing breakthrough energy production methods to power spacecraft propulsion. This includes fundamental physics of energy exchange mechanisms, and how energy exchange mechanisms might relate to kinetic energy of motion. Papers are also invited which describe and compare competing theories or empirical evidence.

MIT Professor Keith Johnson's Cold Fusion Movie, *Breaking Symmetry*, to Debut in Early 1999

It has been a long time coming, but finally *Breaking Symmetry* is done. The 90-minute techno-thriller will first debut, Dr. Keith Johnson hopes, at either the Sundance (Utah) or Cannes (France) film festivals. Then it could begin appearing in some "art movie" theaters later in 1999, depending on how distribution negotiations go. It will almost certainly be on video tape eventually.

Professor Johnson, who retired from the MIT Department of Materials Science to produce movies and to work in new energy technology commercial ventures, wrote, produced, and directed *Breaking Symmetry*. He now works at Quantum Energy Technologies, Inc., a Cambridge, Massachusetts-based company that is working on the augmentation of fossil fuel energy with advanced technologies. QET is also exploring technologies that use water alone as fuel. Ironically, one of the company's facilities is not far from the MIT Plasma Fusion Center, which has worked to discredit all cold fusion research while reaping hundreds of millions of dollars in research funding on hot fusion studies.

The hard-hitting techno-thriller teaches a lot about science and the politics of science at a major university. *Infinite Energy* previewed the near final cut, and predicts that this movie will stir up a lot of comment. MIT officials pointedly ignored Professor Johnson's requests for formal permission to film on campus. Though the movie involves scenes with the exterior of MIT buildings (the fictional "Institute") as background, action scenes were filmed at Wentworth Institute of Technology in Boston. Also, since *Breaking Symmetry* is most definitely R-rated, don't plan on showing the eventual videotape to high school chemistry and physics classes! Professor Johnson has graciously named *IE's* Eugene Mallove as one of the movie's associate producers, for his contributions in reviewing the movie's script and in helping to introduce the movie to the general public.

Professor Johnson and two colleagues were recently (Sept. 1, 1998) awarded U.S. Patent 5,800,576 "Water Clusters and Uses Therefore." Its abstract reads, "The present invention provides water cluster compositions characterized by high oxygen reactivity due to protruding, delocalized p.pi orbitals. The invention also provides methods of producing the structures. The invention further provides methods of using the water clusters, for example in combustion, and compositions associated therewith." The patent is assigned to Quantum Energy Technologies Corporation.

'Whatever happened to. . .?'

It is amazing how idiotic some so-called science journalists can be. One Lane Hartill, who writes for the *Christian Science Monitor* newspaper, wrote a piece of nonsense for the "Whatever happened to. . ." column which is supposed to inform readers about matters in science. Sadly, this one (September 24, 1998) misinforms the newspaper's readers very badly. Of particular note, the writer purloined the logo of our sister newsletter publication, *The Cold Fusion Times*, which is edited by cold fusion scientist Dr. Mitchell Swartz. This means that Hartill had ample information at his finger tips to come to a conclusion quite opposite to the one he drew.

'Whatever happened' continued on page 32

New Energy Times Archive

PROTOCOL OF CONTROL EXPERIMENTS FOR THE PLASMA-ELECTROLYSIS REACTOR N3

Phylipp M. Kanarev *(Translated by Dr. Peter Glück)*
13 Kalinina St., Krasnodar 350044 Kuban State Agricultural University, Russia
E-mail: <nauka@kubgau.kuban.ru> Phone/Fax: 7-8612-682024

Editor's Note: This experimental report is encouraging to those working on the Ohmori-Mizuno Experiment (see cover story *IE* No. 20. We will have more details in issue No. 23.

The plasma-electrolysis reactor was elaborated by the chair of theoretical mechanics of the Kuban State Agricultural University by Prof. Dr. Ph. M. Kanarev, doctor in technical sciences and candidate in chemical sciences, E. D. Zykov was presented for control testing to a committee formed by: V.V. Fomin, leader of the Chair of Physics, Kuban State Agricultural University, doctor in physical-mathematical sciences, professor, president of the committee.

Members of the committee include:

A. S. Trofimov, professor at the Chair of Industrial Thermoenergetics of the Kuban State Technological University, doctor in technical sciences, emeritus performer of science and technics of Russia, correspondent member of the International Academy of Universities, winner of the prize of the leadership of the Russian Federation for science and technics (thermoenergetician); N. P. Berezina, doctor in chemical sciences, professor at the Kuban State University (electrochemist); Ph. M. Kanarev, head of the chair of theoretical mechanics of the Kuban State Agricultural University, doctor in technical sciences, professor; N. A. Singaevskii, candidate in technical sciences, docent of the Krasnodar High Military Forces for Rockets, colonel (electroenergetician); E. D. Zykov, candidate in chemical sciences (physical chemistry of surface phenomena).

The committee has performed control experiments of the plasma-electrolytic reactor.

1. The reactor, having a diameter of 130 mm and a height of 100 mm is built of dielectric materials (organic glass and teflon), has an inter-electrode chamber, anode and cathode as well as connections for feeding the reactor with the working solution and outlet for the heated liquid and the vapor-gas mixture.
2. The reactor is connected to a current source via a rectifier and a voltage controller.
3. The heat carrier is a diluted alkaline water solution, with flow controlled by a valve and a flow measuring instrument.
4. The heated solution and the gas-vapor mixture are flowing out of the reactor via connection outlets.

The reactor works in the following way: By using the rotameter, the desired flow is established at a voltage near to zero. Then the voltage is raised to 150-200 V and in the pericathodic space a consistent plasma is formed. After a few seconds of the appearance of the plasma, the outflow of the heated solution and of the vapor-gas mixture from the reactor starts. The quantity of vapors can be controlled. *In order to increase the accuracy of the measurement, the reactor was built and operated for heating the solution at a minimum quantity of vapors formed.*

Instruments and Equipment Used for the Experiment

The instruments used for measuring the input energy: industrial counter wattmeter, voltmeter (precision class 0.2, Russian standard GOST 8711-78), ampermeter (precision class 0.2 GOST 8711-60).

The instruments used for measuring the output energy: mercury thermometers with 1 and 2 °C divisions up to 100 and 160° respectively, a measuring vessel with 3 liters capacity, a measuring cylinder of 1,000 ml capacity, a chronometer with 0.1 seconds divisions, a balance with a precision of 5 grams.

Experimental Methodology

The 3 liter measuring vessel is placed 0.7 meters above the reactor on a balance and is connected with it via tubes and a rotameter used for the measurement of the flow of the solution. The desired flow is established and the reactor is started. After entering the working regime and the level of the solution is at the control value, it starts the measuring of the change of the weight of the measuring vessel as well as the counting of the numbers of rotations of the wattmeter's disk and the recording of the data of the voltmeter and ampermeter. Simultaneously the outflow of the solution is connected to the measuring cylinder, the weight of which was measured previously.

During the experiment there are established: the time of starting and ending of the experiment, the mean values of the voltmeter and the ampermeter, the temperatures at the inlet and the outlet of the solution. Besides that, the flow is periodically adjusted, based on the values shown at the rotameter.

The experiment is finished when the value of the weight of the liquid from the measuring vessel attains the fixed value. At this moment the outlet of the solution from the reactor is connected to a spare vessel.

Experimental Results

The preliminary tests performed by the authors have shown that the values of the thermal capacity and heat of evaporation for the solutions do not differ much from the respective values for water, therefore these parameters were taken as C1 = 4.19 kJ/kg.deg C and C2 = 2269 kJ/kg known for water.

Experimental values

Parameter	Number of the experiment 1	2	3	Average
1-weight of empty cylinder mo, grams	....	.....	.....	345
2-weight of the solution, prior to entering the reactor, m1 grams	1,200	1195	1,200	1,198
3-weight of the solution, after outflow from the reactor, m2 grams	1,180	1,180	1,180	1,180
4- weight difference, inlet and outlet solution, m1-m2= Δm grams	20	15	20	18.3
5-reactor inlet temperature, t1° C	21	21	21	21
6-reactor outlet temperature, t2 ° C	85	85	85	85
7- temp. difference, Dt =t2-t1° C	64	64	64	64
8- duration of the exp., Dt seconds	279	307	282	289
9- number of rotations of the wattmeter disk	39.5	44.5	41.5	41.8
10- consume of electrical energy based on the counter, kJ	237	267	249	251

$$E1 = \frac{n.3600}{600}$$

Remark: 600 rotations of the counter correspond to 1 kWh electrical energy. The counter is connected in the electrical circuit before the rectifier and measures the consume of both the reactor and the rectifier. The voltmeter and the ampermeter are connected in the circuit after the rectifier and are aimed for measuring the energy consumed by the reactor.

New Energy Times Archive

11- voltage, V	196	200	199	198.3
12 -current, Amps	3.66	3.30	3.58	3.51
13- consume of electrical energy based on the volt- and ampermeter, E2, kJ $E2 = I.V.\Delta t$	200.1	202.6	200.9	201.2
14- energy consumed for heating the solution, kJ $E3 = C1.m1.\Delta t$	322	320.4	322.0	321.5
15- energy consumed for forming of vapors, E4, kJ $E4 = C2.Dm$	45.4	34.0	45.4	37.8
16- total energy, for heating and vapors $E0 = E3 + E4$.., kJ	367.4	354.5	367. 4	363.1
17- K1, COP of the reactor, acc. to wattmeter readings $K1 = \frac{E0}{E1}$	1.55	1.33	1.47	1.45
18- K2, COP of the reactor acc. to the voltmeter and the ampermeter readings $K2 = \frac{EO}{E2}$	1.87	1.75	1.85	1.82

The committee has stated that during the experiment it can be easily seen that gases are flowing out from the connection tubes of the cathodic and anodic spaces. These gases are products of the decomposition of the solution, mainly of the water molecules, and are contributing to the decrease of the weight of water. The authors have not yet elaborated a method for measuring the quantity of these gases, and therefore their energy content was added to the energy content of the water vapors. Given that the energy content of the gases is much higher than that of the vapors, the COP of the reactor is higher as stated in the table. The parameter K2 is based on the reading of the voltmeter and the ampermeter and needs to be improved, because the reactor generates high frequency oscillations which are changing the readings of the instruments. The committee states that the reactor also generates light and sound energy.

The committee is stating that if the contributions of the emitted gases, the light energy and the outer energy losses of the reactor are considered the COP values are higher than those established.

The committee emphasizes the newness of the plasma formation phenomena at the electrolysis of water, associated with incompletely studied processes which generate excess energy and considers that these deserve further thorough study with the aim of finding their possible uses in different scientific and technical areas.

Also present at the experiments were the General Director, V. V. Podobedov, and the head of the Systems Engineering Department, V. E. Goriunov from the "Neoenerghiya" Works.

'Whatever happened' continued from page 30

Your dear Editor sent the *Christian Science Monitor* a letter complaining about this lack of journalistic intelligence. To date, no reply has been received (nor is one expected, if past attempts at error correction are any guide). The letter:

Subject: Cold Fusion Misinformation by Lane Hartill
Sent: 10/9/98 8:10 AM
To: *Christian Science Monitor*, oped@csps.com
Op Ed Editors or Letters Column, *Christian Science Monitor*

D. Sugimoto, via e-mail, asks, 'Whatever happened to ...?'

Cold Fusion

ELECTROCHEMIST B. Stanley Pons and his British colleague Martin Fleischmann shocked the world on March 23, 1989, when they announced they had solved the world's energy crisis.

The solution, they said, lay in table-top "cold fusion," in which palladium and platinum electrodes electrolyze "heavy" water. This, they said, could produce as much heat as a star.

"There were about five weeks of suspended judgment," says David Goodstein, vice provost for physics at the California Institute of Technology. No one could duplicate Mr. Pons and Mr. Fleischmann's results. They had published their results too hastily, thinking they would be scooped.

Caltech scientists later thoroughly debunked the cold-fusion claim.

Scientists still do research linked to cold fusion, but it is largely scorned. Pons and Fleischmann could not be located for this story.

– Lane Hartill

COLD FUSION TIMES

THE THEORY: Cold fusion was supposed to occur after the electrochemical 'loading' of palladium (shown).

If you wonder 'Whatever happened to...' write us at: One Norway Street, Boston, MA 02115 or e-mail: whatever@csmonitor.com

Courtesy: *Christian Science Monitor*, September 24, 1998

Dear Sirs:

Lane Hartill presented blatantly false information in his "Whatever happened to Cold Fusion" piece in your September 24 edition. He stated that, "No one could duplicate Mr. Pons and Mr. Fleischmann's results. . . " In fact, since the announcement by Drs. Fleischmann and Pons on March 23, 1989 there have been several thousand technical papers published on cold fusion, including many high-quality reports published in the peer-reviewed and non-peer reviewed technical literature. Such journals as *Physics Letters A*, *Fusion Technology* (an American Nuclear Society publication), *Journal of Electroanalytical Chemistry*, as well as numerous scientific journals in Japan have published articles confirming the work of Fleischmann and Pons. The Electric Power Research Institute's final report on their cold fusion work concludes: "This work confirms the claims of Fleischmann, Pons, and Hawkins of the production of excess heat in deuterium-loaded palladium cathodes at levels too large for chemical transformation." (EPRI TR-104195, August 1994)

As for the assertion that "Caltech scientists later thoroughly debunked the cold fusion claims," this is utterly false. In fact, Dr. Melvin Miles of the U.S. Navy has published in the peer-reviewed literature a detailed and devastating critique of the Caltech work. He himself has published virtually bullet-proof data showing excess heat correlated with helium-4 production in Fleischmann-Pons type cells.

Lane Hartill states that "Scientists still do research linked to cold fusion, but it is largely scorned." He should ask, "Scorned by whom?" Even a modicum of investigative reporting would prove to him at once that these are the critics who did flawed, rushed experiments in 1989 and are no longer doing experiments. Their gleeful and ignorant followers in the scientific community are the noisy negativists who continue to disseminate falsehoods that are regurgitated by shoddy science journalists. The really good scientists are working on this revolutionary discovery both at universities and in commercial activities aimed at ending the Fossil Fuel Age. Prototype commercial devices have been shown several times on ABC television (Nightline and Good Morning America).

The misinformation by Lane Hartill is not a small matter. It strikes at the root of scientific ethics, the ethics of science journalism, and the energy, economic, and environmental well-being of humanity.

Sincerely, Dr. Eugene F. Mallove
Editor-in-Chief, *Infinite Energy* Magazine

New Energy Times Archive

Physical Laws of the Emerging New Energies as Predicted by Hadronic Mechanics, I: Insufficiencies of Quantum Mechanics*

Ruggero Maria Santilli
The Institute for Basic Research, P. O. Box 1577, Palm Harbor, FL 34682
ibr@gte.net,http:/home1.gte.net/ibr

This series of articles is further evidence of the current leading role by corporations in the support of truly innovative research which has become impossible in the contemporary academic-governmental community. —R. M. Santilli

1. INTRODUCTION

1.1. The Fundamental Open Problem of the Emerging New Energies

Undoubtedly, a most significant development of the final part of this millennium has been the emergence of various *new forms of energy.* Without any claim of completeness due to the variety of existing and ongoing research, I quote:[1]

1] Clear experimental evidence of the existence of stimulated nuclear transmutation in biological structures, the studies of which were initiated in the past century [see, *e.g.,* Refs. [1a} and quoted literature];

2] The emergence of the clear possibility of obtaining energy via cavitation effects in ordinary water by various researchers [see the recent review articles by E. Mallove [1b}];

3] The celebrated electrolytic cell by M. Fleischmann and S. Pons [1c}, for instance, in the realization by Y. Arata and Y.-C. Zhang described in the recent article by M. Carrell {1d};

4] The Patterson power cell {1e};

3] The catalytic fusion of deuterium into Helium-4 by L. C. Case [*1f};

4] The exploding water mist known since the earlier part of this century and recently studied by P. Graneau and his associates {1g};

5] Nuclear augmented combustion based on lithium, studied by Harry Taplin [1h];

6] The light element fission based on proton-lithium reactions studied by W. D. Gwinn and his associates {1i};

7] The large aggregates of electrons studied by K. R. Shoulders [see the recent article by R. Nelson {1j}];

8] The new non-fossil combustible gas called AquaFuel™ discovered by W. Richardson and currently developed by Toups Technology Licensing [TTL] of Largo, Florida, presented in various articles appeared in *IE* [see, *e.g.,* the latest article by the author {1k} and references quoted therein];

9] The hadronic energy studied by R. M. Santilli based on mechanisms at the level of nuclear constituents [hadrons], rather than nuclei {1l}; and several others.

The fundamental open problem of all the above studies, for which they are all rejected by the scientific establishment, is that *research on new energies currently lacks a quantitative theoretical interpretation.*[2]

In fact, most of the *new energies are not* predicted by the discipline established at this time, quantum mechanics. Moreover, a quantitative treatment of the new energies with a new discipline which is as consistent as quantum mechanics does not exist at this writing. The lack of acceptance by the scientific establishment is then an unavoidable consequence.

A symptomatic illustration of the current status of the field is the statement made by Nobel Laurate Murray Gell-Mann during a recent lecture at Portland State University: "Cold fusion is theoretically impossible and there are no experimental findings that indicate it exists."

After reaching a position at Harvard University under support from the Department of Energy, I left academia as a necessary condition to conduct the studies outlined in these articles for *IE* [see a chronology of the events in Refs. {2a,2b}]. Therefore, I am the last person to agree with Murray Gell-Mann on the status of particle physics in general and on his quark conjecture, in particular.

Yet, we must all agree for objectivity with the first part of Gell-Mann's statement: "Cold fusion is theoretically impossible," of course, when referred to established doctrines as Gell-Mann tacitly did. Lacking a quantitative theoretical representation [in the sense of footnote[2], the scientific establishment has no other alternative than that of dismissing the new field. Lack of consideration of available experimental evidence is then a mere consequence as seen from the viewpoint of the scientific establishment.[4]

The main point which was carefully avoided by Murray Gell-Mann and does not appear to have received a due light in the literature of the new energies either, is that *new energies in general, and cold fusion in particular, are incompatible with Einstein's special relativity,* as we shall see in Sect. 3.1. *That is the real political problem of the new energies vis-a-vis the academic-governmental establishment.* Therefore, for all orthodox physicists with sufficient technical knowledge, the mere "consideration" of experimental evidence on the new energies is, *de facto,* an admission of doubt on the exact validity of the beloved special relativity, with consequential automatic expulsion from the academic-governmental complex.

. . . quantum mechanics has been unable to reach an exact representation of total nuclear magnetic moments beginning with that of the deuteron despite numerous attempts conducted by numerous physicists throughout this century (and a river of public money). . .

This is the reason for my belief that, presently, fundamental advances in research *cannot* be achieved by our society without a joint consideration of issues pertaining to scientific ethics and accountability {2}. More specifically, I believe that main positions by the physics establishment should be first inspected under ethical and legal grounds, and only thereafter appraised for their possible [generally lacking] scientific content.[5]

This is also the reason for a potentially historical shift in the U.S.A. as well as abroad of the conduct of truly innovative research, from the traditional academic-governmental complex to corporations. As an example, qualified research on "new" basic advances, that is, advanced beyond Einstein's special relativity, (which cannot be claimed by any person in good faith to be possible today at Princeton University, Harvard University, the California Institute of Technology and the like) are nowadays solely supported by corporations.

This is also the reason why the scientific function of journals such as *Infinite Energy* is simply invaluable, because the research is not otherwise permitted by the contemporary academic-governmental complex.

1.2. Definition of "New" Energies

In these papers I am solely interested in studying new energies as per the following:

DEFINITION 1.2.1: A form of energy is hereon said to be "new" if and only if it is not predicted and quantitatively treatable via

* Copyright © 1998 By R. M. Santilli

New Energy Times Archive

quantum mechanics, chemistry, superconductivity or other established disciplines.

Secondly, I am primarily interested in quantitative theoretical studies of new forms of energy whose Coefficient of Performance [COP] is over-unity.

$$COP^{Out}_{In} = \frac{E_{Out}}{E_{In}} > 1 \qquad [1.2.1]$$

Third, I am primarily interested in identifying physical conditions under which the above over-unity can be either manifested or improved.

To begin, it is important to dispel a number of misconceptions regarding the above identified *new energies.*

All conceivable forms of energy permitted by established disciplines have been subjected to systematic studies conducted by thousands of scientists throughout this century. The hope that these theories could still permit the discovery of basically "new" forms of energy is so removed as to discourage any interest on my part, and motivate my admiration for colleagues attempting that route.

I should also warn innovative researchers against attempting the representation of *"new" energies* with "pre-existing" doctrines. To my best knowledge, all attempts along those lines have resulted into a number of controversies, for which reason they are rejected by both innovative and orthodox physicists.

An illustration is given by P. Graneau and his associates in their claim that the over-unity of the exploding water mist {1g} is due to conventional molecular effects such as "atmospheric heat," while carefully excluding new sources of energy. By recalling that the mist explodes with a thunder stronger than that produced by the equivalent amount of dynamite, this conventional "explanation" is easily established by calculations to be implausible, not only because it is numerically insufficient to explain all data, but also because the final temperature of the system is essentially the same as the original one. Graneau's conventional "interpretation" is therefore rejected by both the orthodox Cantabridgean circles I know well, as well as by all researchers in new energies that I know [including myself].

Similar unsettled controversies result for all other cases of "explanations" of "new" energies via pre-established doctrines. It is time for both innovative and orthodox scientists alike to acknowledge that "new" energies as per Definition 2.1. require "new" theories.

I should also warn orthodox physicists that the belief in the "final" character of quantum mechanics is no longer accepted by a large percentage of their own orthodox peers. As we shall see, most of them are nowadays engaged in one or another *generalization* of quantum mechanics, such as quantum deformations, string theories, supersymmetries, etc., although none of them has seen any practical application, and none is in sight to my best knowledge.

Another misconception I would like to dispel upfront is a rather widespread belief that over-unity implies the violation of the principle of conservation of the energy. The complete scientific formulation of the energy balance requires the necessary inclusion of *all* energies, and not only the output and input energies, as in Eq. [1.2.1].

In particular, the total output energy $E_{Tot,Out}$ is the sum of the output energy as in Eq. [1.1.1] plus all internal losses due to heat, dispersions, etc., while the *total input energy* $E_{Tot,In}$ is the sum of the outside energy supplied to the systems [say, the electrical energy], plus the internal energy of the system itself. It is easy to se that their ratio is always *smaller* than one because of our inability to account for all possible losses,

$$COP_{Tot} = \frac{E_{Tot,\,Out}}{E_{Tot,\,In}} = \frac{E_{Out} + E_{Losses}}{E_{In} + E_{System}} < 1 . \qquad [1.2.2]$$

The over-unity as per Eq. [1.2.1] is therefore fully compatible with the principle of conservation of energy because it deals only with parts of the total energies.

The most effective way to establish the latter possibility is by recalling that *over-unity energies [according to the above definition] are fully permitted by quantum mechanics.* A notorious example is that of nuclear power plants which have a COP^{Out}_{In} of the order of 10,000, but always such that the COP_{Tot} remains smaller than one when the intrinsic energy of the system [this time given by the fissionable nuclei] are included,

$$\frac{E_{Out,Nuclear}}{E_{In,Nuclear}} \approx 10{,}000 , \qquad [1.2.3a]$$

$$\frac{E_{Tot,\,Out}}{E_{Tot,\,In}} = \frac{E_{Out} + E_{Losses}}{E_{In} + E_{Nuclei}} < 1 . \qquad [1.2.3b]$$

As an example, in the transition from a nuclear power plant to cavitation, explosion of water mists, or AquaFuel, we merely replace the internal energy of fissionable nuclei with the internal energy of the water. The novelty is that the latter needs to be studied with *new theories* for its very identification, as we shall see.

In short, the over-unity character of new energies is fully plausible because it is compatible with existing physical laws, thus deserving quantitative studies.

1.3. Statement of Objectives

The primary scope of these papers specifically written for *IE* is that of outlining a quantitative theoretical representation of new energies [in the sense of footnote[2]] which is permitted by a generalization of quantum mechanics called *hadronic mechanics* that I originally proposed back in 1978 when at Harvard University under DOE support {3a}. Hadronic mechanics was subsequently studied by numerous mathematicians, theoreticians and experimentalists [see monographs {3b,3c} and references quoted therein], and has recently achieved operational maturity in refereed journals of the establishment [see memoirs {3d-3f}].

As we shall see, the representation of *new energies* via hadronic mechanics has the following main features: 1] It is mathematically consistent; 2] It verifies all conventional physical laws; 3] It is invariant under the time evolution of the theory as well as all applicable symmetries; 4] It already possesses numerous applications and experimental verifications following specific numerical predictions; and 5] It is a "covering" of quantum mechanics in the sense of admitting the latter as a particular case.

The primary objectives of these papers are: a] achievement of a representation of at least some of the emerging new energies via hadronic mechanics; b] identification of the conditions under which said energies are possible and, c] use the knowledge acquired in this way to propose specific possibilities for improving the COP^{Out}_{In}.

For instance, after achieving a quantitative representation of plausible conditions under which the deuterium can be stimulated to synthesize the helium-4, we shall identify specific treatments of the heavy water under which the efficiency of the process has a chance of increasing.

Needless to say, I am merely referring to possibilities submitted to interested colleagues for independent appraisals. Nevertheless, if quantitative representations achieve full maturity in due time following all necessary improvements and independent contributions, the current laborious trials and errors in the study of *new energies* will be replaced by systematic studies.

Quantitative studies on *new energies* via hadronic mechanics require the necessary consideration of the following seven main aspects:

1] IDENTIFICATION OF THE INSUFFICIENCIES OF QUANTUM MECHANICS IN VARIOUS FIELDS. Rather than being a "final" theory for all possible conditions existing in the universe, quantum mechanics possesses well-defined boundaries of applicability within which the theory is valid, but beyond which

New Energy Times Archive

the theory is generally *approximate* or *inapplicable* [rather than being "violated"]. These insufficiencies have a fundamental relevance for new energies because they are an evident prerequisite for possible novelty. These insufficiencies are some of "the best kept scientific secrets" of the establishment because, even though discussed and at rare times admitted in academic corridors, they are never mentioned in the orthodox literature. These insufficiencies are known to researchers in *new energies*. Nevertheless, for completeness, in the next section I shall review those insufficiencies which are particularly important for new energies.

2] INCONSISTENCIES OF EXISTING GENERALIZED THEORIES. When faced with the evidence of the limitations of quantum mechanics, a general tendency is that of suggesting the use of one or another of the numerous broader theories that have been attempted during this century. Another "best kept scientific secret" is that these broader theories are afflicted by physical inconsistencies so severe to prevent their use in practical applications. In fact, they generally violate the fundamental condition of invariance of the basic units, data elaboration and numerical results, thus having no physical meaning known to me. Serious quantitative studies of new energies therefore require at least a knowledge of these inconsistencies which are outlined in a future Paper II. In particular, these inconsistencies show how difficult is the task of identifying a mathematically and physically consistent generalization of quantum mechanics.

. . . following attempts throughout three-quarters of a century and the use of a river of public money, quantum mechanics still misses a real understanding of the nuclear force.

3] NEED FOR NEW MATHEMATICS. It has been nowadays established in the mathematical literature [see, *e.g.,* Ref. {3e}] that the achievement of invariance for physical conditions outside the arena of applicability of quantum mechanics requires new mathematics specifically constructed for that purpose, that is, new numbers and fields, new vector and Hilbert spaces, new algebras and geometries, etc. No serious quantitative studies of the new energies can be done without an outline of this new mathematics which will be presented in Paper II.

4] OUTLINE OF HADRONIC MECHANICS. The rudiments of the new mechanics will be presented in Paper II jointly with an outline of its application to generalizations of other disciplines, such as quantum chemistry. As indicated earlier, studies on the construction of hadronic mechanics over the past two decades have been quite vast.[6] In these articles I can outline only the most salient aspects and refer to Refs {3} for technical descriptions.

5] AVAILABLE APPLICATIONS AND EXPERIMENTAL VERIFICATIONS OF HADRONIC THEORIES. Yet another aspect which is important for a serious appraisal of the studies presented herein is that hadronic mechanics already has a number of applications and experimental verifications in a variety of fields. An outline of these verifications is presented in Paper III because they provide the necessary credibility for the application of hadronic mechanics to *new energies*.

6] PHYSICAL LAWS OF NEW ENERGIES. Upon the presentation of the preceding results, and in the event of interest by researchers in the field, I can study the physical laws of new energies as per Definition 1.2.1 in the form predicted by hadronic mechanics. This study is conducted in paper IV.

7] STUDY OF SPECIFIC FORMS OF NEW ENERGIES. As illustrations, and again in the event of interest by researchers in the field, I can finally study some of the new energies via hadronic mechanics for the purpose of submitting possible ways of improving their efficiency, attempting alternative realizations and submitting other applications. This final task shall be presented in Paper V.

Note that the studies presented in these papers are at their infancy and so much remains to be done. I, will therefore, have achieved my objectives if I stimulate the interest of experts in *new energies* to continue studies along these lines. I would be grateful for any constructive criticism on the technical content of these papers or on insufficiencies of its literature that may lead to improvements of future presentations.

By no means do I claim the representation of *new energies* via hadronic mechanics to be the only viable one. In fact, real scientific inquiries [those outside controlling academic interests] are known to be polyhedric because each theory can at best contain only a grain of truth.

Other quantitative representations of *new energies* as per Definition 1.2.1 are encouraged, but under the conditions that: A] they are based on theories broader than quantum mechanics; B] are proved to be as invariant as quantum and hadronic mechanics at all levels and as a necessary condition to claim novelty and, C] they are not equivalent to hadronic mechanics [*i.e.,* they are outside the class of equivalence of hadronic mechanics which is that characterized by arbitrary, multivalued, nonlocal, nonlinear and nonunitary transforms].

2. INSUFFICIENCIES OF QUANTUM MECHANICS IN VARIOUS FIELDS

2.1. Conditions of Validity of a Given Theory

The history of science teaches that physics and all other quantitative sciences should never admit "final theories." No matter how good any given theory may appear at a given time, its subsequent replacement with a broader theory for more general conditions is inevitable.

Moreover, physics and all quantitative sciences in general have an absolute standard of value: experimental verification. The validity of a theory can therefore be inferred solely from its capability to represent experimental data. The inverse posture of denying experimental evidence just because it does not conformto pre-existing theories is ascientific.

Experiments themselves have their own standards of value; the more basic the law or property to be tested, the more important the experiment. As a result, the appraisal of the validity of a theory is primarily based on the verification of primary basic laws or properties, with lesser relevance carried by lesser relevant tests.

Representations themselves have their own standard of values because, to be scientifically credible, they have to occur *directly from the basic axioms of the theory considered* without mathematical manipulations or the customary introduction of*ad hoc* parameters to adapt existing experimental data to pre-existing theories.

In these papers I shall therefore use the following:

DEFINITION 2.1.1: A given theory is said to be "valid" if and only if: 1] it represents "all" experimental data of the field considered; 2] all such representations are "exact;" and 3] the representations occur without the introduction of physically unmotivated parameters. If any given theory represents the experimental data only in part, it is said to be "approximately valid." If any given theory violates one or all of the above requirements, it is said to be "inapplicable" [rather than violated"] because it is not constructed for the conditions at hand.

The "historical curve" of a given theory is essentially the following: Founders generally submit their theories for well-defined physical conditions, often called the "original arena of applicability" of the given theory. For instance, quantum mechanics was conceived and constructed to represent the hydrogen atom, which is therefore its original arena of applicability; the special theory of relativity was historically proposed to represent particles which can be well-approximated as being point-like when moving in the homogeneous and isotropic vacuum; general relativity was originally submitted to represent gravitation for the representation of point masses in vacuum, etc.

When new theories are initially presented, they are generally

New Energy Times Archive

dismissed by organized academic interests of the time, and claimed to be figments of imaginations. It is well-documented that this is exactly what happened to quantum mechanics, as well as to the special and the general relativities at the time of their birth.

Subsequently, theories based on sound assumptions generally receive experimental verifications, after which they become accepted by the academic establishment.

With the passing of time, all important problems of the original arena of applicability of a given theory become exhausted. A rather natural historical process is, therefore, that of attempting the application of the theory for conditions beyond those of its original conception.

At that point it is a widespread practice to *modify* the theory to represent the new conditions and then claim that the theory is still valid. These adaptations are generally done by introducing of *ad hoc* parameters which have no known or otherwise conceivable physical meaning.

At that very moment, there is the transition from science to academic politics. In fact, whether orthodox or not, to be "scientific" any paper on a theory requiring unknown parameters for the representation of given experimental data must explicitly state the "approximate character" of the theory itself. If there is silence on this fundamental point, the paper violates basic tenets of scientific ethics, no matter how important is the author, his/her affiliation, or the journal publishing the article.

The unknown parameters which are introduced to reach experimental fits characterize precisely the *deviation* of the theory from the experimental evidence at hand. After all, to be valid, a theory must represent the experimental data from its basic axioms without any modification [Definition 2.1.1]. Lack of acknowledgment of these evident scientific facts, not in informal talks in academic corridors, but instead in *publications* creates clear problems of scientific ethics.

As we shall see, there are too many adulterations of rigorous scientific proceedings aimed at the adaptation of quantum mechanics and other established theories to experimental facts.

The final stages of an established theory are generally marked by excesses perpetrated by organized interests in academia, yet are tolerated by our society because of the credibility and power of their institutions.

Some of the schemes include suppressing, discrediting or jeopardizing the scientific process on new theories via the disqualification of the researchers, the dismissal of novel experimental evidence or the opposition to undesired basic experiments and other misbehavior [see Refs. {2} for unreassuring cases and their documentations]. Other schemes imply sheer adulterations of experimental data, deceptions under public support and other manifest violation of the Civil and Criminal Codes of Laws perpetrated at high ranking institutions under protracted impunity because of their unfortunate tolerance by our permissive societies.

Nowadays, quantum mechanics, the special and general relativities are clearly in in their final stages depicted above. The *new energies* are emerging in this scientific scene, thus being the victims of scientific manipulations by opposing academic interests. This is the reason why really innovative advances can nowadays be reached solely via the joint consideration of issues pertaining to scientific ethics.

All in all, judging from my personal experience as well as that of numerous other colleagues, it is a truism to state that *the most ascientific aspect of our contemporary societies is the current scientific process.*

In this section I shall attempt to provide readers with elements useful to reach an independent judgment on the exact or only approximate validity of quantum mechanics, the special and the general relativities. I will have achieved my task if I succeed in showing that the *problem of the theories valid for new energies is open at this writing.* True research is not conducted with arrogant claims of universal validity of old doctrines, and should be based on the humble statement: *we do not know.*

2.2. Insufficiencies of Quantum Mechanics in Atomic Physics

Quantum mechanics [see, *e.g.,* textbook {4} and references quoted therein] is one of the most majestic disciplines constructed in this century, with applications, implications and verifications in virtually all scientific branches.

Some of the important features of the theory are: its remarkable axiomatic consistency characterized by the mutual compatibility of all the various formulations; its verification of all basic physical laws of the particle world experimentally established to date; and the capability to predict numerical results which are invariant under the time evolution of the theory as well as all possible symmetries.

Despite these clearly historical results, quantum mechanics cannot possibly be a "final theory" because it admits clear insufficiencies in its conceptual, mathematical and experimental foundations, as it is the fate of all scientific theories [including the generalized theories presented in these papers]. The only issue which can be scientifically debated is the selection of a covering theory admitting quantum mechanics as a particular case, yet applying to more general conditions.

The main objective of Paper I is to identify the insufficiencies of nonrelativistic and relativistic quantum mechanics that have a direct bearing with new energies, and point out the physical conditions beyond which the theory can only be claimed to be *approximately valid* as per Definition 2.1.1. These insufficiencies will then be the foundations of our subsequent studies.

This presentation is warranted by the fact that the insufficiencies of quantum mechanics are known to experts in the field, because I and several others have discussed them with colleagues in "leading" academic institutions verbally and in personal correspondence. Yet, these insufficiencies are "the best kept secret of the trade," because they are never presented in Ph.D. courses or in technical papers originating from said "leading" institutions. Also, the numerous, yet isolated criticisms of quantum mechanics existing in the "unofficial" literature do not appear to be specifically focused toward new energies.

The first authoritative doubts on the final character of quantum mechanics were expressed by Albert Einstein and his group. In fact, Einstein, Podolsky and Rosen [E-P-R] {5a} in 1935 presenting the view that quantum mechanics is "incomplete," a view which is nowadays known as the the *historical E-P-R argument* [see also the historical account by J. von Neumann {5b}]. Numerous "completions" of quantum mechanics were then attempted throughout this century, without achieving consistency and maturity for applications.

In these papers I shall show that hadronic mechanics has achieved a consistent "completion" of quantum mechanics precisely along the historical E-P-R argument [the reader interested in a preview may study paper {5c}, specifically, on that topic]. I shall then outline available applications and experimental verifications. Comprehensive presentations and related literature are available in Refs. {3}.

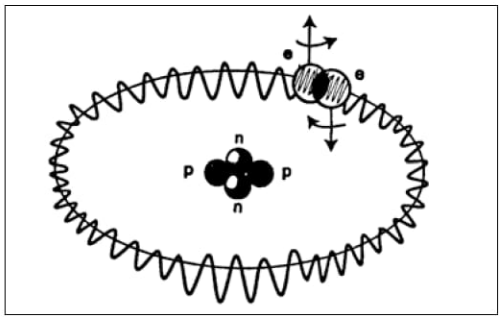


Figure 1. A schematic view of the inability by quantum mechanics to explain the correlation/coupling of the two electrons in the helium atom and, more precisely, the inability to explain the underlying Pauli's exclusion principle.

New Energy Times Archive

Quantum mechanics can be claimed to be exact for the ground state of the hydrogen atom because, in accordance with Definition 2.1.1, it represented the *totality* of the experimental data in an exact way.

On strict scientific grounds, *quantum mechanics cannot be considered as exact for the excited states of the hydrogen atom because of a number of unsettled insufficiencies for quantum numbers greater than two.* For instance, the disagreement between the predictions of quantum mechanics and the experimental data for the Lamb shift in the 3S state of the hydrogen atom is of the order of 20% {6a,6b}.

Disagreements up to 50% exist between the predictions of quantum mechanics and the experimental data of the cross section of electrons scattering on a hydrogen molecule {6c,6f}.

In the transition from the hydrogen atom to multi-electron systems, the insufficiencies of quantum mechanics become much greater. Well known in this respect is the dissident voice by J. Slater {6g} who, for that reason, was kept outside the physics establishment.

More specifically, *quantum mechanics cannot be claimed to be exact for all atoms heavier than the hydrogen* because of its inability to represent all data in an exact way.

Experimental evidence establishes that the two electrons of the helium atom orbit together, not in a disjoint form, but in a "correlated" form, *i.e.,* they can couple in a singlet quasi-particle bound state as in Figure 1. The inability of quantum mechanics to represent this occurrence is evident because, according to that theory, two identical electrons cannot possibly form a bound state due to the known repulsive Coulomb force.

More specifically, the insufficiency rests in the inability of quantum mechanics to provide a quantitative explanation of Pauli's exclusion principle which is generally *assumed* as a pillar of the theory without any explanation. In fact, quantum mechanics has been unable to provide a quantitative-mathematical representation of the reason why two electrons cannot occupy the same orbit with the same quantum numbers, and are admitted only when they have different quantum numbers, such as spin antiparallel.

The impossibility for quantum mechanics to explain Pauli's exclusion principle is due to the fact that the "exclusion" can only occur via interactions. The only interactions representable via quantum mechanics are those via the addition of a potential energy to the Hamiltonian. The problem is that any attempt along these lines is bound to be in dramatic disagreement with reality because the added potential alters all the spectroscopic lines that are, in effect, known with extreme precision.

In short, the sole possible interpretation of Pauli's principle requires "interactions at-a-distance without energy exchange," a notion dramatically beyond any possible quantitative treatment by quantum mechanics.

As we shall see, besides verifying Pauli's principle in its entirety, hadronic mechanics permits its first known interpretation precisely because it introduces a new class of interactions without energy exchange that are represented with anything *except* the Hamiltonian.

Quantum mechanics represents the radiation emitted by the hydrogen atom with an incredible accuracy, while in the transition to the helium we begin to see spectroscopic deviations from the predictions of the theory. These deviations increase with the increase of the size of the atoms.

At this point, supporters of quantum mechanics retort to all sort of machinations in an attempt to adapt physical reality to their beloved theory. This is generally achieved via sheer political manipulations deprived of scientific content, such as the admission of a combination of *different* orbits for the spectrum emitted by one orbit, the introduction of unknown parameters "to make things fit" and other schemes.

The final test recommended to researchers in *new energies* to ascertain whether a supporter of the validity of quantum mechanics for all atoms is on good faith or not, is to let him/her "face the Sun," that is, ask the exact representation via quantum mechanics of the spectrum of electromagnetic waves emitted by the Sun. This is a known impossibility because the Sun emits a seemingly infinite spectrum while we know only those of a finite number of atoms.

In summary, numerous, clear, incontrovertible and independent insufficiencies establish the historical E-P-R "incompleteness" of quantum mechanics in atomic physics beyond scientific or otherwise *credible* doubts.

2.3. Insufficiencies of Quantum Mechanics in Nuclear Physics

Nuclear physics is another field in which quantum mechanics has made historical contributions [see, *e.g.,* the historical references {7a-7c}, the more recent textbooks {7d,7e} and others easily identifiable].

Nevertheless, the insufficiencies of quantum mechanics in nuclear physics are greater than those in atomic physics. They are also known to experts in the field, as I can personally testify during my stays at MIT, Harvard University and similar institutions, but they are equally unavailable in the technical literature and carefully avoided in Ph.D. courses.

It is evident that the insufficiencies of quantum mechanics in nuclear physics have a truly fundamental role for novel quantitative studies on new energies, as we shall see in detail in subsequent papers.

The only scientifically correct statement which can be made at this writing is that quantum mechanics provides a *good approximation* of the nuclear structure, but it *cannot* be claimed to be *exact* in that field because the theory failed to represent in an exact way *all* nuclear characteristics beginning with the lightest nucleus, the deuteron.

In fact, quantum mechanics has been unable to reach an exact representation of total nuclear magnetic moments beginning with that of the deuteron despite numerous attempts conducted by numerous physicists throughout this century [and a river of public money]. This insufficiency is clearly stated in Ref. {7c}, p. 31, while the claims of valid representations of nuclear magnetic moments ventured in more recent treatises, such as that by A. de Shalit and H. Feshbach {7d} have no scientific credibility, as we shall see in this section.

As of today, quantum mechanics still misses 2.3% of the numerical value of the nonrelativistic treatment of the magnetic moment of the the simplest possible nucleus, the *deuteron,* as one can see in Ref. {7c}, p. 109 or Ref. {7d}, p. 61.

Progressively larger deviations up to the order of 30% and

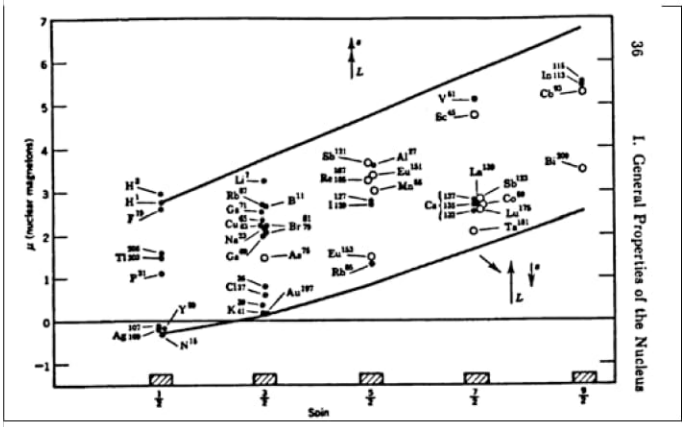


Figure 2. A schematic view of the experimental values of total nuclear magnetic moments from Ref. [7a] which fail to follow the predictions of quantum mechanics and are instead contained within minima and maxima called the Schmidt limits. More specifically, the known values of the intrinsic magnetic moments of protons and neutrons and the quantum mechanical rules of their additions as valid in the atomic structure do not yield the experimental value of total nuclear magnetic moments. Therefore, the Schmidt limits of this figure represent precisely the deviations of the numerical predictions of quantum mechanics from the experimental data on nuclear magnetic moments.

New Energy Times Archive

more exist in the representation of the magnetic moment of bigger nuclei. These deviations grow to truly large percentages for the heaviest nuclei. Similar insufficiencies of quantum mechanics also exist in the representation of other nuclear data.

As we shall see, the additional insufficiencies of quantum mechanics in nuclear physics are also crucial for quantitative studies of new energies via more appropriate theories.

The reason for the impossibility of quantum mechanics to represent exactly total nuclear magnetic moments is known by experts in the field, although it is not generally disclosed in the technical literature. The Founders of nuclear physics, such as E. Fermi {7a}, L. Rosenfeld {7b} and others had already identified this shortcoming in the 1940's and suggested as the most logical explanation that *when protons and neutrons [collectively called nucleons] became members of a nuclear structure, they experience a deformation of their shape [charge distribution] due to the intense nuclear forces. Such deformation implies an alteration of the intrinsic magnetic moments of the particles* [one may inspect this statement in p. 31 of Ref. {7c}]. This conception is today known as "the [forgotten] historical hypothesis" on the deformability of nucleons.

This historical hypothesis can be easily seen at the classical level. In fact, any charged and spinning sphere possesses a magnetic moment along the direction of spin. All modifications of the *shape* of the sphere then imply a necessary alteration of the magnetic moment. Note that these alterations can occur without any change of the intrinsic angular momentum.

Nuclear magnetic moments cannot be exactly represented by quantum mechanics because: 1] the theory assumes the conventional values of the intrinsic magnetism of protons and neutrons when the particles are isolated in vacuum; 2] the theory cannot represent extended, nonspherical and deformable particles; and 3] any possible alteration of the intrinsic characteristics of particles in vacuum is prohibited by the basic pillars of the theory, the space-time symmetries. The Founders of nuclear physics then argued that, if the intrinsic magnetic moments are changed in nuclear conditions due to deformations, an exact representation of total nuclear magnetic moments is expected, a prediction that has turned out to be correct [see future Paper III].

Note that the deformation of the charge distribution of protons and neutrons when members of a nuclear structure is quite plausible because these distributions are extended and subjected to very intense nuclear forces [perfectly rigid bodies exist in academia but certainly not in the physical reality]. Moreover, the alteration of the intrinsic magnetic moment due to the deformation of shape is established at the classical level [indicated above], as well as at the atomic level [for the magnetic polarization of electron orbits].

Note also that the alteration of the intrinsic magnetic moment of protons and neutrons is fully compatible with the *conventional* value of spin 1/2, Pauli's exclusion principle and other physical laws. We are referring to a deformation of shape *without* altering the intrinsic angular momentum [spin], as one can see beginning at the classical level.

Following the view presented in Ref. {7c}, it was understood that the above "historical hypothesis" *cannot* be represented via quantum mechanics for numerous different reasons, such as the fact that: all deformations are strictly incompatible with quantum mechanics because they would imply the violation, for instance, of its fundamental rotational symmetry [which is solely valid for absolutely *rigid bodies,* as is well known]; the deformation is not allowed by another pillar of quantum mechanics, the Poincare~ symmetry; and for several other technical reasons.

All these facts establish the *impossibility* for quantum mechanics to reach an exact representation of *all* total nuclear magnetic moments, with small deviations for small nuclei and large deviations for large nuclei.

When faced with this historical experimental evidence, supporters of the exact validity of quantum mechanics in nuclear physics [by far the great great majority of the current nuclear physics community as I can personally testify {2a}], resort to all sort of machinations to adapt physical reality to their beloved theory.

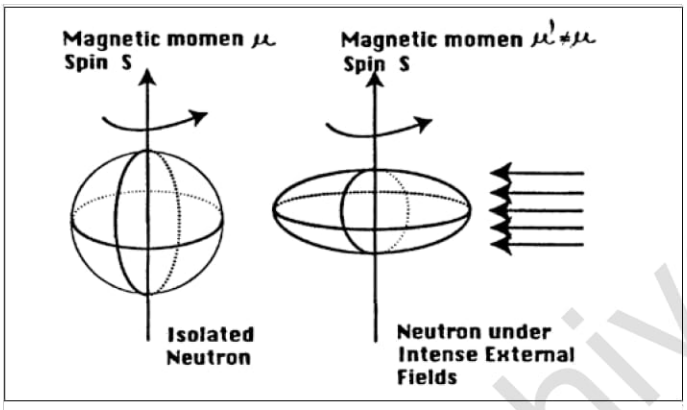


Figure 3. A schematic view of "the historical hypothesis" formulated by the founders of nuclear physics in the 1940's as needed to represent total nuclear magnetic moments, according to which protons and neutrons experience a deformation of their charge distribution when members of a nuclear structure with consequential alteration of their *intrinsic* magnetic moment under conventional values of the spin. This representation is strictly impossible for quantum mechanics for various reasons, resulting in the impossibility for the theory to reach an exact representation of total nuclear magnetic moments, as is well known.

The most familiar scheme is that of representing the deuteron as a *mixture of the ground state and excited states.* As an example, one can read in Ref. {7c}, p. 108, that the deviation of the prediction of quantum mechanics from the experimental value of the deuteron magnetic moment is a "direct measure" of the admission of the D-state in addition to the ground state, with similar statement available in Ref. {7d}. The more recent Ref. {7e} claims that the addition of further states can reduce the deviation of nonrelativistic quantum mechanics from the magnetic moment of the deuteron to about 1%.

In my view, the interpretation of the deuteron as a mixture of different states is a political machination without scientific content, for various reasons. The experimental value of the magnetic moment of the deuteron is measured for the nucleus in its stable ground state and definitely not for a conjectural mixture of different energy levels.

Moreover, one of the pillars of quantum mechanics is the stability of the individual energy levels of a stable bound state when unperturbed. The admission of a mixture of different energy levels for the unperturbed deuteron is therefore against a very pillar of quantum mechanics.

Also, another foundation for which the notion of "quantum" was born is that transitions from different states require the emission or the absorption of energy. The conjectural belief in the orthodox nuclear physics literature that the deuteron admits mixtures of different states without emission-absorption of energy, then implies the exiting of the boundaries of science.

After seeing the impossibility of achieving a scientific representation of nuclear magnetic moments via *nonrelativistic* quantum mechanics, a more serious scientific deception is perpetrated by the claim that relativistic quantum treatments can resolve the issue [see, *e.g.,* Ref. {7f} and papers quoted therein]. To begin, nonrelativistic quantum mechanics provides a very good approximation of the ground state of the hydrogen atom in which the electron is known to move at relativistic speeds with relativistic corrections providing numerically small changes which, for that reason, are called "fine."

In the transition to the deuteron, it is well known that its proton and neutron constituents positively move at nonrelativistic speeds due to their mass being 2,000 times bigger than that of the electron. The very claim that relativistic quantum mechanics can resolve the missing macroscopic percentages at the nonrelativistic level is a calculated scientific deception,

New Energy Times Archive

because experts know well that, in the latter case too, relativistic corrections can be at best very small.

After realizing the above numerical limitations, orthodox physicists keep adding more energy levels over those conjectured at the nonrelativistic level. The point is that, to qualify as "experts," these authors must know that such an assumption implies the violation of the basic pillars of the beloved theory they want to salvage.

But let us assume that, as a result of machinations and deceptions, the magnetic moment of the deuteron is finally represented. Fine. But then *what happens to all remaining nuclei?*

When orthodox physicists look happy because of the personal belief that the magnetic moment of the deuteron can be well-represented with their beloved theory, true scientists should ask them the representation of the magnetic moment of *heavy* nuclei, such as zirconium. Their grim face expresses the acknowledgment of the impossibility of such a task, no matter whether one uses nonrelativistic or relativistic quantum mechanics or quantum field theory, thus acknowledging with their silence the political-nonscientific nature of the claim.

Other, more audacious orthodox physicists venture the personal belief that the problems of quantum mechanics for nuclear magnetic moments are "nonexistent" [a most frequently used word by organized interests in nuclear physics] because the correct nuclear structure is that in terms of *quarks* and, therefore, the correct theory is Quantum Chromo Dynamics [QCD] [see, e.g., Ref. {8} and literature quoted therein].

At this point I suggest researchers in new energy do what I usually do under these circumstances, just walk away, because the transition from the real nucleons to the imaginary quarks, and the hope of resolving real problems with the latter, implies the transition from real science to academic religion. As such, the view does not deserve comments by true researchers.

For readers of *IE* not familiar with the horrendous conditions of particle physics, the occurrence is due to the plethora of unresolved inconsistencies of the hypothesis that quarks are physical constituents of hadrons, such as lack of confinement, impossibility to define gravity, and other truly huge inconsistencies [see next section]. At any rate, QCD is a *nonlinear theory,* which means that nobody can calculate exact solutions. When orthodox experts claim that the problems in nuclear physics are resolved by quark theories, they do so in full knowledge that no exact calculation is possible, thus unmasking the nonscientific nature of the posture.

At any rate, the conjectural orbits of the conjectural quarks can only be very small [not bigger than 1 fm $\approx 10^{-13}$ cm]. The polarizations of these orbits are then known to yield at best contributions to the magnetic moment of the nucleons of the order of 10^{-5}, thus being grossly insufficient to permit a scientific representation, *i.e.,* a representation outside academic interests.

In short, even ignoring the horrendous intrinsic inconsistencies of quark conjectures, the insufficiencies of quantum mechanics are *multiplied,* rather than decreased, in the transition from the real nucleons to the imaginary quarks.

Researchers in new energies should know that, for reasons we shall see in detail later on, I believe that *quark conjectures are, by far, the worst political obstacles against quantitative studies of new energies.*

By comparison, as we shall see in Paper III, via a simple quantitative representation of the historical hypothesis on the deformability of protons and neutrons, hadronic mechanics achieves an exact representation of the magnetic moments of *all nuclei in their ground state.* This representation is vigorously rejected by organized interests in nuclear physics because it requires the surpassing of their beloved theory.

In summary, the current scheme in nuclear physics going on for half a century on the lack of representation of all nuclear magnetic moments with nonrelativistic quantum mechanics, then passing to relativistic and QCD extensions with a multiplications of the insufficiencies, are a violation of the U.S. Criminal Code of Laws because they consist of an intentional, organized deception perpetrated under public financial support. The problems of scientific ethics and accountability[8] are aggravated by the systematic suppression of exact representations reached via more general theories such as hadronic mechanics, perpetrated by the journals of the American, Italian, British, Swedish and other Physical Societies, as well as numerous other journals.

A more unreassuring aspect is that the insufficiencies of quantum mechanics for nuclear magnetic moments are only the proverbial tip of the iceberg, because much greater insufficiencies exist for other aspects of nuclear physics.

Another reason why it is *impossible* for quantum mechanics to be exact in nuclear physics is visually established by the evidence that, unlike atoms, *nuclei do not have nuclei* {3c}.

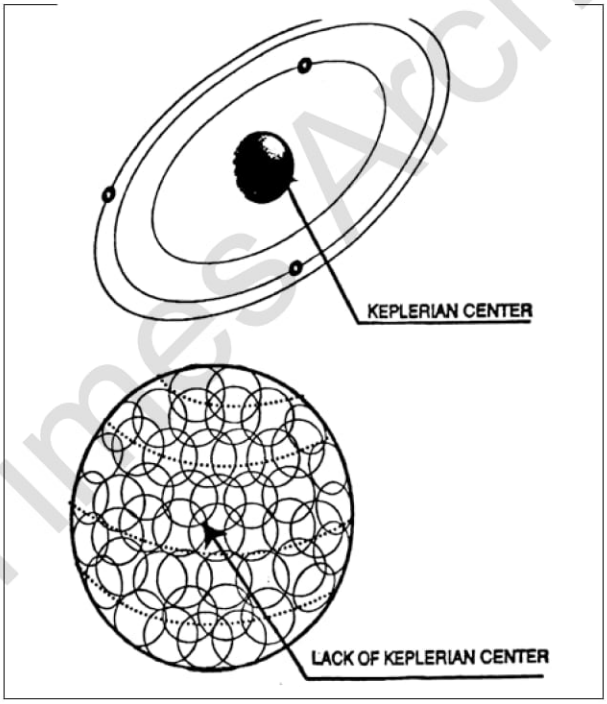


Figure 4. A schematic view of the primary differences between the atomic and the nuclear structure: the former constitutes a Keplerian system with the heaviest constituents in the center, while the latter does not constitute a Keplerian system and does not possess a Keplerian nucleus. This structural difference has truly fundamental implications inasmuch as it implies that the space-time symmetries of the former cannot be exactly valid for the latter. As a consequence, a theory which is valid for the Keplerian structure of atoms cannot be exactly valid for the non-Keplerian structure of nuclei.

The pillars of nonrelativistic [relativistic] quantum mechanics from which all results can be uniquely and unambigously derived is the fundamental Galilei [Poincare] symmetry of the Minkowskian spacetime. When subjected to computer visualization, these symmetries characterize the historical *Keplerian systems,* that is, systems possessing the *heaviest member in the center* [the Keplerian nucleus], with lighter constituents orbiting around it. This is precisely the structure of atoms, thus confirming the good approximation of quantum mechanics for atomic structure.

By comparison, a basic characteristic of nuclei is that of having no Keplerian nucleus at all, and being instead composed by a number of extended protons and neutrons in *contact* with each other. In fact, nuclei admit in their center an arbitrary constituent.

This evidence is sufficient per se to guarantee the lack of exact validity for the nuclear structure of the mechanics which is valid for the structure of the hydrogen atom. In fact, the only way to achieve an exact representation of nuclei as they are in physical reality is to *modify the Galilei and Poincare symmetries in such a way to suppress the Keplerian nucleus.* This is a major

New Energy Times Archive

structural modification of the theory, technically characterized by the fact that the modified symmetry is no longer isomorphic to the original symmetry, thus establishing clear insufficiencies of quantum mechanics in nuclear physics.

When supporters of quantum mechanics are faced with this additional evidence, they resort to additional machinations in the hope of salvaging their beloved theory. A most familiar one is the statement that the correct theory of nuclear physics is not quantum mechanics, but quantum field theory [see, *e.g.,* Ref. {8} and literature quoted therein] at which level, so orthodox physicists claim [not me], the problem of the lack of Keplerian center is resolved.

When proffered by famous experts in nuclear physics from distinguished institutions, such a machination is usually ventured in the hope of achieving credibility via the use [actually, the abuse] of the fame of their institutions and the hope that their audience is ignorant.

To qualify as "experts," these individuals must know that the insufficiencies of quantum mechanics in nuclear physics are *multiplied* when passing to quantum field theory. The recommended test to ascertain the good or poor faith is to ask for the exact representation via quantum field theory of the total magnetic moment and other experimental data of the deuteron, let alone that of the zirconium nucleus.

In summary, publications based on the exact use of the Galilean and Poincare symmetries for nuclear structure without a clear identification of their approximate character constitute another violation of the U.S. Criminal Code of Law, because they are a deception under public funding.

A definition of "crime" throughout history is that of "damage against society." The suppression of the approximate character of quantum mechanics and related basic symmetries in nuclear physics by the academic establishment implies, as we shall see in detail, the suppression of new energies, new forms of recycling nuclear waste, and other basic needs, thus constituting "damage against society" beyond any possible doubt. In reality, the manipulatory suppression of fundamental physical insufficiencies perpetrated by "leading" physicists via the abuse of the authority of their institutions constitutes a crime against society far greater than ordinary crimes, such as stealing $100 at the local grocery store. The unreassuring aspect is that the perpetrators of the latter quickly go to jail, while the perpetrators of the former continue in their crimes in a totally unperturbed way, decade after decade, because of the general lack of interest by their victims.

By far the biggest insufficiency of quantum mechanics in nuclear physics occurs for the nuclear force. As it is well known, quantum mechanics can only represent *action-at-a-distance forces derivable from a potential.* As a result, the representation of the nuclear force attempted throughout this century has been that via potentials.

The studies initiated in the early 1940's via the use of *central potentials* as occurring in the atomic structure [*i.e.,* potential solely depending on the magnitude of the mutual distances r of the nuclear constituents]. It soon emerged that central potentials were insufficient to represent experimental data. New non-central potentials were then invented and added to the central ones, but they too were insufficient to represent experimental data, thus requiring the introduction of newer and newer potentials.

By following this historical process we reach the current situation whereby quantum mechanics attempts to represent the nuclear force via the use of a Hamiltonian with an unreasonably large number of potentials {7d},

$$H_{Nuclear} = \Sigma\, p_k^2/2m_k + V_1 + V_2 + V_3 + V_4 + V_5 + V_6 + V_7 + V_8 + V_9 + V_{10} + V_{11} + V_{12} + \ldots \qquad [2.3.1]$$

The unreassuring reality is that, following attempts throughout three-quarters of a century and the use of a river of public money, quantum mechanics still misses a real understanding of the nuclear force. Enough is enough. We have now reached a point that additional attempts at representing nuclear physics by adding more potentials are a scientific deception which should not be tolerated with leniency, but should instead be submitted to legal examinations particularly when perpetrated under public support.

Again, the originators of nuclear physics knew the impossibility of quantum mechanics reaching an exact representation of the nuclear force irrespective of the number of potentials. The problem only exists in current organized interests in nuclear physics, but not on historical or scientific grounds.

The reason is that, unlike the case of the atomic structure, the nuclear constituents are in a state not only of "contact" with each other, but actually in conditions of mutual penetration of their charge distribution for an average of 10^{-3} parts of the nucleonic volume [as established by comparing the experimental data on the volumes of nuclei and nucleons]. But nucleons are some of the densest objects measured in the laboratory by mankind until now. It then follows that their mutual penetration in the nuclear structure requires the presence of "contact interactions" which, by conception, have *"zero range."* As such they *are not action-at-a-distance,* thus being *beyond any hope of scientific representation via potentials.*

In short, there is no doubt that the nuclear force admits components derivable from a potential which, as such, are representable via quantum mechanics. Nevertheless, it is equally unquestionable that the nuclear force contains components not derivable from a potential, thus being conceptually and technically beyond any possible representation via quantum mechanics.

When faced with this additional evidence, orthodox physicists generally ignore the issue. According to my personal experience, they simply have no believable counter-argument.

I am told that the process of bringing to courts dishonest scientists at major universities has already begun in the U.S.A. and Europe. I sincerely hope these legal proceedings will be intensified as a necessary premise for new basic advances. In fact, I exclude the possibility that research on new forms of energy, new recycling of nuclear waste and other basic needs of our society can be conducted via a real scientific process without subjecting to legal proceedings the organized oppopsition at "leading" institutions.

I cannot close this section without the additional denunciation of the deplorable condition of stimulated nuclear transmutations and decays which are of direct relevance for new energies.

As it is well known, experiments in the sector have been and continue to be strongly opposed, disrupted and jeopardized by the U.S. physics establishment because they are expected to invalidate directly quantum mechanics, thus undermining the billions of dollars of public funds yearly spent in physical research, all religiously restricted by governmental agencies committed to the exact validity of quantum mechanics. As we shall see in detail in future papers of this series, stimulated nuclear transmutations and decays require *nonunitary transforms,* thus exiting the class of equivalence of quantum mechanics.

Yet, as we shall see, the absorption of one proton by a nucleus under certain necessary conditions is fully equivalent to the accretion of electrons by a ball lightning, thus being fully plausible. Also, when nuclei are *naturally unstable,* they may clearly admit *stimulated decay* via resonating frequencies, nuclear deformations or other techniques, thus rendering quite plausible stimulated decays.

One [among several] main reasons for the decay of scientific ethics is that, irrespective of whether or not these mechanisms exist, *they cannot be ruled out via academic talks prior to systematic experimental studies.* Again, it is the suppression of the scientific process that constitutes a clear crime against society for personal gains.

The deplorable condition in the field has reached such

New Energy Times Archive

extremes that "distinguished" physicists, such as H. Feshbach of the Massachusetts Institute of Technology, have abused the authority of their institutions and gone to the extreme of public appearances on ABC TV and in the newsmedia to disclaim and disqualify the possible presence of stimulated nuclear transmutations in the emerging new energies, prior to any systematic experimental study. By comparison, and contrary to Feshbach behavior, whenever facing *terra incognita,* such as stimulated nuclear transmutation and decay, real scientists always prefer the humble, "I do not know."

The gravity of the behavior by H. Feshbach should be denounced because it is perpetrated in full awareness, as I can personally testify {2a} and document {2b}, that his posture is a *de facto* public opposition against: 1] undesired scientific advances; 2] undesired new industries, such as those developing new forms of energy and recycling nuclear waste; and even 3] undesired studies on the actual age of the *Sacra Sindone* [the Sacred Shroud of Turin, Italy].[9] To put it bluntly, because of protracted impunity by our society and actual governmental backing, the decay of scientific ethics in nuclear physics has now reached such extremes, not only to have large *scientific* implications by opposing basic advances, and large *financial* implications by suppressing the birth of new industries, but even large *religious* implications, by opposing experiments on the real age of the Sacred Shroud of Turin.

The mere admission of the possibility that naturally unstable nuclei admit mechanisms of stimulated decay implies: the birth of new theories, new equipment for recycling nuclear waste, and a new approach to the dating of the Sacred Shroud of Turin.*

Ironically, H. Feshbach and his colleagues appear to be unaware that, by opposing for evident personal gains so clearly valuable scientific inquiries and industrial developments, as well as so clearly important religious issues, they have disqualified themselves as scientists and severely damaged the credibility of their abused institutions {2}.

In conclusion, the above occurrences establish the historical E-P-R "incompleteness" of quantum mechanics in nuclear physics beyond scientific or otherwise credible doubt. The scientific reality is that quantum mechanics has permitted outstanding advances in nuclear physics, yet it is not the final theory for the field considered, because of its approximate validity. Once this scientific reality is admitted, and only *after* that, the search for a more appropriate theory can be initiated. Only then can an orderly scientific process on *new energies* be initiated.

2.4. Insufficiencies of Quantum Mechanics in Particle Physics

As the complexity of physical systems increase, the insufficiencies of quantum mechanics become greater.

We have seen before that, in the transition from atomic to nuclear structures, the insufficiencies of quantum mechanics increase. Along the same lines, in the transition from the structure of nuclei to the structure of strongly interacting particles [called hadrons, see, *e.g.,* Ref. {8}], the insufficiencies of quantum mechanics became even greater. These insufficiencies are also known to experts, as I can personally testify. Yet they are not openly treated in technical literature or presented in Ph.D. courses, to the best of my knowledge.

The insufficiencies of quantum mechanics in particle physics have a role for quantitative studies of *new energies* perhaps deeper than the insufficiencies in nuclear physics. This is due to the fact that *new energies* originate precisely at the particle level. Any claim of "final" character of quantum mechanics in particle physics would therefore deny the very notion of "new" energies as per Definition 1.2.1.

*Because of its exposure to the intense light expected from the Resurrection, the intense infrared radiation due to an old fire, and other events through the centuries may have merely *stimulated* the decay of some of the *naturally unstable nuclei of C^{14}, thus altering the results of the carbon dating.* Yet, to remain aligned with H. Feshbach and the organized interests in nuclear physics, the "scientists" who recently performed the carbon-dating of the Sacred Shroud of Turin are on record as of excluding the latter possibility because it is "not predicted by quantum mechanics."

As is the case for nuclei, hadrons too do not possess the Keplerian structure necessary for the exact applicability of the fundamental Poincare symmetry. Moreover, nuclei increase in size with the increase of the number of constituents. On the contrary, all hadrons have approximately the same size [the radius of their charge distribution] which is of the order of 1 fm = 10^{-13} cm which remains constant with the increase of their mass. This value coincides with the radius of the wavepacket of any massive particle. As a result, the constituents of hadrons have a wavepacket which is of the same order of magnitude as the size of the hadrons themselves.

It then follows that, while the nuclear constituents are in conditions of *partial* [generally small] mutual penetration, the hadronic constituents are instead in conditions of *total* mutual penetration, each one inside all others. These conditions establish the impossibility for quantum mechanics to be exactly valid for the hadronic structure on numerous independent grounds.

Detail to be shown in Paper II(future issue), the latter conditions imply the inapplicability of the *mathematical foundations* of quantum mechanics, let alone the theory itself, including the inapplicability of: the underlying topology [because notoriously local while deep wave-overlappings are nonlocal]; the basic vector spaces [because notoriously linear while deep wave-overlappings are nonlinear]; the basic axioms [because they are purely potential while deep wave overlapping required contact nonpotential effects]; and other reasons.

The arena of original conception of quantum mechanics, the atomic structure, is essentially *empty* due to the large mutual distances of the constituents, while hadrons are some of the densest objects measured in the laboratory until now. The idea that a discipline conceived for the former can be exactly valid for the latter has no scientific credibility outside vested-organized academic interests.

When exposed to the above scenario, supporters of quantum mechanics voice the great successes achieved by *quark models* in predicting new hadrons. In reality, this success occurred for the *Mendeleev-type classification* of hadrons into families, while we are considering here the *different* [yet complementary] problem of the *structure* of each hadron in a unitary multiplet.

I believe that the unitary, Mendeleev-type classification of hadrons into families achieved by the [color] SU[3] model has a final character. By contrast, I believe that quarks are what they are, mere mathematical representations in the mathematical unitary space which cannot be defined in our space-time. Therefore, I do not believe that quarks are physical *elementary* particles in our space-time.

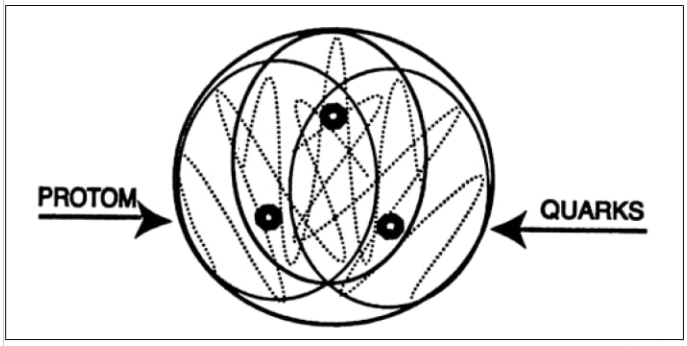


Figure 5: A schematic view of the contemporary conjecture according to which a proton is composed by three constituents which cannot be physically isolated in laboratory, called *quarks* [where we have ignored gluons and other aspects for simplicity]. Even though quarks are believed to have *point-like charges* as the electrons, to be physical particles they must have *extended wavepackets* whose size is essentially the same as that of the entire proton, thus resulting in a structure with the total mutual penetration of the constituents. The lack of a Keplerian center then renders inapplicable the basic space-time symmetries and related mechanics valid for atoms. Additional reasons studied in Paper II [related to the hyperdense character of the hadronic structure] imply the impossibility that a mechanics valid for the virtually empty atomic structure will be exactly valid for the hyperdense hadronic structure.

New Energy Times Archive

I was among the very first authors to indicate back in 1981 {9a} the impossibility for quarks to be elementary constituents of hadrons, a notion which is now acquiring rather general acceptance, evidently without any quotation of my first presentation {9a}. The reason is that, once quarks are admitted as being *composite,* the problem of the real, physical, elementary constituents of hadrons is admitted as being fundamentally open, thus passing the torch to a more realistic theory.

The dichotomy, classification vs. structure, is the result of an historical teaching which is completely ignored at "leading" academic institutions {2a}. Suppose that at the turn of the century a student in physics proposed to his_her teacher the study of *one single model for both, the classification of all atoms into families and the structure of each individual atom of a given family.* That student would have been thrown out of college because the impossibility of doing classification and structure with one single model was very well known.

In fact, atoms required *two different yet complementary models,* the Mendeleev classification into families and the different, yet compatible structure of each atom of a given family via quantum mechanics.

Note in particular that the solution of the structure of the atoms required a *new mechanics, i.e.,* quantum mechanics [where the noveltywith respect to the Newtonian mechanics of that time], as well as *new mathematics, i.e.,* the first use in physics of Hilbert spaces over complex numbers.

Similar historical teachings emerged for the classification and structure of nuclei and molecules.

Now, what have quark believers doneí They have completely ignored the above historical teachings and attempted to solve both, the classification and structure of hadrons via one single model, that based on quark conjectures. In so doing, they did reach splendid achievements in the *classification,* but at the price of a plethora of inconsistencies and mounting controversies for the complementary problem of *structure.*

A systematic study of these aspects has been done by the authors in Refs. {3,9}.

First, there is the historical *lack of confinement of quarks* [which is needed from their lack of existence as isolated particles] {9a}. In fact, a rigorous confinement [defined as the identically null probability of tunnel effects of free quarks] is directly incompatible with a pillar of quantum mechanics, Heisenberg's uncertainty principle. Therefore, the assumption of the latter theory as exact requires the abandonment of quark conjectures as having physical reality.

Secondly, it has been proved that *matter made up of quarks cannot have gravity* {9b}. In fact, gravity can only be defined in our spacetime, while quarks are solely defined in the mathematical unitary space without any possible interconnection [technically established by the O'Raifeartaigh theorem].

Very audacious "experts" at this point offer the possibility of combining space-time and internal symmetries via the so-called supersymmetries. In so doing they lose any possible credibility because of serious structural inconsistencies of supersymmetries recalled in Paper II [violation of the unitary structure with consequential lack of invariance of Hermiticity-observability and numerical prediction]. The credibility of said "experts" is then trashed by the fact that supersymmetries predict an ocean of *new* conjectural particles, *none* of which has been experimentally detected so far. To be treated as scientists, experts in supersymmetries should prove the axiomatic consistency of their theory and establish experimentally its predictions *before* voicing its possible use to mix space-time and internal symmetries.

The claim that quarks have "masses" and, therefore, can characterize gravity, is another of those statements proffered by academia via the abuse of the authority invented by their institutions in the ill-fated expectation of passive ignorance by independent researchers such as myself and many others.

A necessary condition for any mass to be physical [*i.e.,* to exist in our space-time], is that it must be the eigenvalue of the second-order Casimir invariant of the Poincare~ symmetry. This basic condition is grossly violated for quarks because they are known not to be representable via the Poincare~ symmetry owing to their fractional charges and other technical reasons.

As a result, on real scientific grounds, quark "masses" are *mere mathematical parameters in the mathematical unitary space* with no connection to physical masses known to me.

A discipline which leads to matter without gravity when applied to the structure of protons, neutrons and all hadrons, simply cannot be considered as a final theory outside organized academic interests, and, in any case, will not pass the test of time. The only open scientific issue is the identification of the *generalization* of quantum mechanics which is applicable to the structure of the hyperdense hadrons.

The reader should be made aware that, whenever U.S. national laboratories and other institutions release official statements on "measurements of quark masses," they violate the U.S. Criminal Code of Law because of deception perpetrated under public financial support. Most deplorable is the official statement by Fermilab a couple of years ago of having "discovered the top quark." Such a statement was blatantly deceptive because: 1] the experimentalists detected a particle predicted by the theory inclusive of top quarks, and positively they did not detect the top quarks themselves; 2] the top quarks have no physical masses which can be credibly defined in our space-time and, thus, cannot be remotely detected by real equipment and 3] the top quarks cannot be credibly confined, thus resulting in a theory dramatically against experimental evidence; etc. etc. etc.

Readers of *Infinite Energy* should be aware that *quarks are the worst enemy of new energies for various reasons we shall review in the subsequent papers.* Any official statement by U.S. national laboratories or primary academic institutions on "discovery of new quarks," "measurements of quark masses," and the like does not just constitute a clear violation of scientific ethics and accountability, but implies the *de facto* suppression of due scientific process on *new energies,* new recycling of nuclear waste and other topics of primary current interest for our society, because of the evident reason that the latter are not predicted by quark conjectures.

In particular, it is my firm conviction that no scientific process will be possible in truly novel basic advances so needed by our society until the officers of U.S. governmental laboratories and primary institutions releasing the above statements on quark conjectures are prosecuted in criminal and civil courts.

After decades of organized, intentional deception in the hadronic structure perpetrated by the physics establishment following a complete impunity due to backing by the political and newsmedia establishments, the idea that corrective measurements could occur without judicial interventions can only occur to the uniformed or the accomplice.

Quantum mechanics has additional insufficiencies in virtually all aspects of particle physics, besides that of the structure of hadrons indicated above. As a matter of fact, they are so numerous as to render impossible their review here because their study would imply a prohibitive length. I only measure basic insufficiencies in exact-numerical representations of the behavior of the mean lives of unstable hadrons with energy, the Bose-Einstein correlation and condensation, the scattering theory and its application to deep inelastic events, and numerous others.

The generally intentional deception [because perpetrated under documented awareness] in these cases is that of: 1] throwing in parameters of physically, unknown origin; 2] claiming that, in this way, the experimental results are fully compatible with the beloved theories; and 3] abstaining from the indication that the unknown parameters introduced to represent experimental data are precisely a measure of the deviation of the data from the theory.

New Energy Times Archive

For brevity, I refer the reader interested in these additional limitations to Sect. 15 of memoir {3d} and Refs. {3b,3c}. Note that only *one* problematic aspect would be sufficient to justify the construction of a covering of quantum mechanics and the statement: *we do not know*.

All the above occurrences establish the historical E–P–R "incompleteness" of quantum mechanics in particle physics beyond any possible doubt.

2.5. Insufficiencies of Quantum Mechanics in Superconductivity

The insufficiencies of quantum mechanics in superconductivity [see *e.g.,* Ref. {10}] are quite similar to those for the structure of the helium. As we shall see, these limitations are particularly important for quantitative studies of *new energies*.

Superconductivity exhibits the presence of the Cooper pair which is composed by *two identical electrons in singlet coupling which are bonded together so tightly that they even tunnel together through a potential barrier*. This occurrence is structurally equivalent to the correlation_bond of the two electrons of the helium.

It is evident that quantum mechanics cannot be claimed to be exactly valid for the Cooper pair. Since the electrons are *identical,* quantum mechanics cannot possibly predict any bound state among them because of the repulsive Coulomb force. The insufficiencies of quantum mechanics in superconductivity then become self-evident for scholars in good faith.

At this point the supporters of the final character of quantum mechanics venture the existence of a good quantum mechanical description of superconductivity {9}. A scrutiny of this description reveals that it is based on the *density matrix,* that is, the model is of *statistical character* describing a *large number of Cooper pairs.*

On the contrary, the problem considered above is that of the binding of *two* electrons against their repulsive Coulomb force. Any claim that quantum mechanics can achieve a representation of this physical reality is just another unethical posture maintained for personal gains.

Moreover, quantum mechanics achieves a statistical description of an ensemble of Cooper pairs by postulating the existence of a new particle called a "phonon" which is highly controversial and far from being independently established in particle physics.

As indicated by the Greek meaning of the name, the notion of "phonon" can indeed be introduced for *sounds propagating in our atmosphere.* Their counterpart in the particle world is that of "photons," namely, *quanta of energy propagated by empty space* [vacuum]. To achieve a statistical representation of superconductivity, "phonons" have to be different than "photons," yet have to propagate in empty space as necessary for all quantum interactions [which are based precisely on the exchange of a virtual or physical particle]. The conjectural-unverified character of the description of superconductivity according to quantum mechanics, and the need for a more adequate theory is then beyond credible doubt.

In summary, clear experimental evidence establishes the historical E–P–R "incompleteness" of quantum mechanics in superconductivity as well.

2.6. Insufficiencies of Quantum Mechanics in Gravitation, Astrophysics and Cosmology

Similar, although technically more involved insufficiencies exist for quantum mechanics when applied to other fields. For instance, in astrophysics we have the following unsolved problems: the energy balance of the universe computed via quantum mechanics requires a large "missing mass" which cannot be accounted for by intergalactic dust or any other known entity; quantum mechanics predicts that Earth is bombarded by about 10^{20} neutrino/cm^2, *none* of which has been detected to date in a credible way; we are unable to reach a final understanding of the cosmological quasars redshift, particularly for

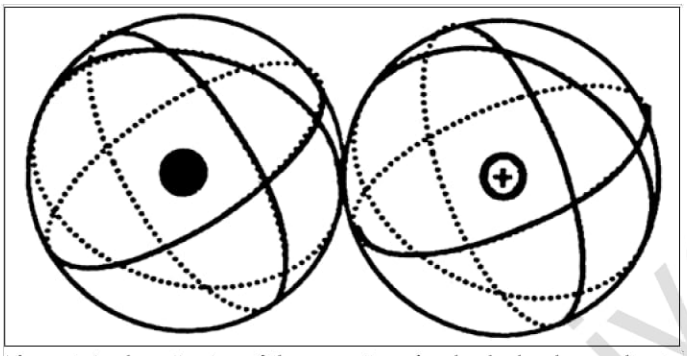


Figure 6. A schematic view of the conception of molecular bonds according to quantum mechanics and chemistry for which *neutral* atoms are just put together resulting in a bond while preserving their individuality. The insufficiency of such a view to represent the very strong attractive forces among the atoms of a molecular bond are beyond *credible* doubt. The reader is encouraged to examine this occurrence, namely the fact that the very contemporary conception of molecular structure is basically insufficient. In this way the reader can begin to see the far-reaching possible implications for *new energies*.

quasars that are at rest with their associated galaxies according to clear gamma spectroscopic evidence, yet have dramatically different redshifts, which would imply their being far apart with very different speeds; and other basic problems which have no apparent hope of solution via quantum mechanics.

In cosmology the insufficiencies of quantum mechanics also emerge rather forcefully because of various problems which have remained unsolved throughout this century, such as those of the "dark matter," the "missing mass," and others.

More technically, the insufficiencies in cosmology are due to the failure of quantum mechanics to achieve a unification of all interactions. Einstein himself failed to achieve such a unification. In turn, the lack of a unified theory implies a number of cosmological inconsistencies, such as the notion that time becomes dependent on the assumed interaction, while a single notion of time would be admitted by a unified theory.

It should be indicated that truly novel advances in astrophysics will unquestionably be valuable for the study of *new energies.* For example, possible mechanisms removing the "missing mass," or eliminating the unobserved solar neutrinos would likely be applicable to new forms of energy.

All the above insufficiencies establish the lack of completion of quantum mechanics in astrophysics and cosmology as well./

2.7. Insufficiencies of Quantum Mechanics in Chemistry

Quantum chemistry [see *e.g.,* Ref. {11} and literature quoted therein] constitutes another majestic achievement of this century which has produced practical benefits to mankind of everyday use.

Yet, it is the fate of all quantitative sciences, thus including chemistry, to never admit a "final theory." The first duty of any true scientist in chemistry is therefore that of identifying the insufficiencies of quantum chemistry, as a necessary pre-requisite for basic advances.

Again, these limitations are known to experts in the field, as

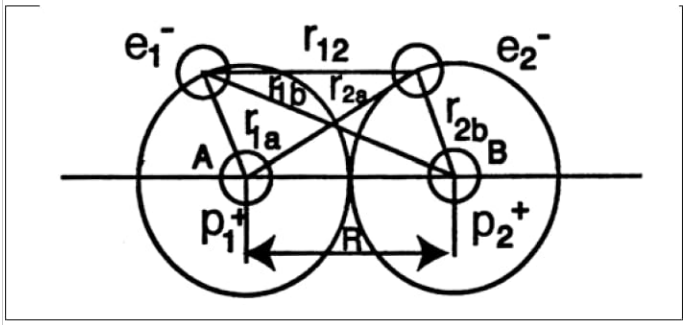


Figure 7. A schematic view of the null value of the average force among two hydrogen atoms, and the consequential insufficiency of the force in molecular bonds of current models.

New Energy Times Archive

I can personally testify, although their presentation is carefully avoided in technical publications or in Ph.D. courses, particularly in those at the so-called "high ranking" institutions. A review of these limitations is a necessary pre-requisite for quantitative studies on new energies.

I have indicated before the importance for *new energies* of the insufficiencies of quantum mechanics in particle, nuclear and atomic physics. This presentation would be incomplete without the corresponding insufficiencies in chemistry because they play a truly crucial role for *new energies.*

The first insufficiencies of quantum chemistry are a direct consequence of the assumption of quantum mechanics as the underlying theory. Quantum mechanics is well known to represent systems which are: *time reversal invariant* [that is, their image under time reversal is physical], *perfectly rigid,* and solely admitting potential, action-at-a-distance interactions. These conditions are necessary for the original objectives of the theory, a representation of the atomic structure or the structure of crystals, which are indeed reversible, perfectly rigid and entirely potential.

These basic properties become a drawback for certain objectives of quantum chemistry, such as quantitative representations of *chemical reactions* which are notoriously *irreversible* [that is, their image under time reversal violates the principle of conservation of the energy or other law]. At this point in our analysis the belief of the exact character of quantum mechanics implies the exiting of the boundaries of science. In fact, no final scientific representation of irreversible processes can be claimed without a theory whose basic axioms are structurally irreversible, which is an evident impossibility for quantum mechanics and chemistry.

What is lesser known is that quantum chemistry also possesses serious insufficiencies in the description of the simplest possible *reversible* structures, such as the hydrogen molecule, let alone the structure of more complex molecules such as:

1] Quantum chemistry has not identified a force sufficiently strong to really account for the molecular bond as it occurs in nature. In fact, the atoms of a molecular bond are *neutral,* in which case *the average of all forces among the molecular constituents is identically null without any resulting attraction.* Quantum chemistry tries to represent molecular bonds via "exchange forces" according to which the valence electrons of different atoms are exchanged, but these forces are well known from nuclear physics to be very small and, therefore, they are insufficient to represent the strong forces between the atoms of a molecular bond. Other attempted forces, such as van der Waals forces, also fail to provide the attractive force of the strength necessary to explain molecular bonds.

2] Quantum chemistry admits an arbitrary number of atoms in the hydrogen molecule, thus being dramatically against experimental evidence. This is proved beyond reasonable doubt because quantum chemistry attempts to represent molecular bonds via some of the forces first identified in nuclear physics, such as the exchange and van der Waals forces. These forces were conceived for an *arbitrary number of constituents* as a necessary condition to represent nuclear structures [which have a number of constituents from two to 100]. These nuclear arguments are evidently extendable to molecular bonds, thus providing rigorous proof of the admission of an arbitrary number of hydrogen atoms in the H_2 and H_2O molecules, in dramatic disagreement with the physical reality.

3] Quantum chemistry has been unable to achieve an exact representation of the binding energy of the hydrogen molecule via unadulterated first principles. In fact, there is a historical 2% still missing despite efforts conducted throughout this century by a large number of chemists. Recently, a few attempts have managed to improve the accuracy. However, as we shall see in Paper III, they imply a necessary *structural alteration of the basic axioms of quantum chemistry* which is euphemistically called by academia "Coulomb screening," while its real meaning is that of a structural alteration of the Coulomb law at the foundation of quantum mechanics, and consequential exiting of the boundaries of science.

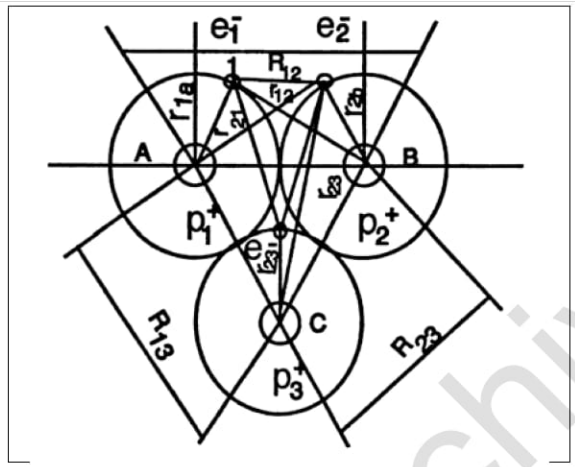


Figure 8: A schematic view of the admission of an arbitrary number of hydrogen atoms in the H-molecule, contrary to experimental evidence. This situation persists under the admission of exchange, van der Waals and other forces of nuclear type currently used in quantum chemistry.

4] Quantum chemistry cannot provide a meaningful representation of thermodynamical aspects. In fact, the value of 2% missing in the representation of binding energies is misleadingly low, because in reality it corresponds to about 950 Kcal/mole while an ordinary thermodynamical reaction takes an average of 20 Kcal/mole. In thermochemical reactions quantum chemistry can, therefore, be off by a factor as great as 50.

5] Quantum chemistry has been unable to reach an exact representation of the electric and magnetic dipole and multipole moments of the hydrogen and other molecules. These representations lack a few percentages for the hydrogen molecule and larger percentages for bigger molecules, to such an extent that they have at times the *wrong sign* [see *e.g.,* Ref. {11b}, p. 22]. Moreover, as we shall see in subsequent papers, current models of molecular bonds imply the capability by the hydrogen and water in their liquid state to be fully ferromagnetic, which is also contrary to physical reality [see also Ref. {11b} for available experimental values of the *diamagnetic* character of water].

6] Computer usages in quantum chemical calculations require excessively long periods of time. This occurrence is due to the slow convergence of conventional quantum series and has persisted to this day, despite the availability of more powerful computers.

7] Quantum chemistry has been unable to explain the "correlation energy" which is advocated for the missing percentages of the binding energies.

8] Orbital theories work well at qualitative and semi-empirical levels, but they remain afflicted by yet unresolved problems, such as the correlation among many electrons as compared to the evidence that the correlation occurs mainly for *electron pairs.*

9] Representation of 100% of the experimental data can only occur with the introduction of a number of empirical parameters which lack a physical or chemical meaning and motivation. They are in effect a measure of the *deviation* of quantum chemistry from reality.

10] Other traditional methods, such as configuration interactions [CI], are capable of improved accuracy via a sufficiently large Gaussian screening of the Coulomb potential. However, the latter constitute a structural deviation from the axioms of the theory. In addition, they require unacceptable amounts of computational resources and time due to the very large number of configurations needed for exact results.

The reader should be aware that, as I can personally testify for a number of cases, all the above insufficiencies are well known to "experts" in quantum chemistry at "leading" institu-

New Energy Times Archive

tions, yet the same are never admitted [or even mentioned] in orthodox papers in the field. Jointly, papers admitting the inconsistencies are systematically suppressed and their authors "disqualified."

It is therefore my documented opinion that the condition of basic research in chemistry has now reached such a point of deception to warrant its examination by the judicial system as a necessary condition for truly novel advances in the field.

Dissident views in support of personal gains should keep in mind the definition of "crime" as "damage to society," the comparatively much greater damage to society perpetrated by the above deception when compared to ordinary crimes such as stealing $100, and the impossibility for self-correction by the establishment due to decades of impunity following complete backing by the political and newsmedia sectors.

The above evidence establishes the insufficiencies of quantum chemistry for a deeper understanding of molecular structures beyond credible or otherwise scientific doubts. In turn, their possible resolutions are at the foundations of quantitative studies on *new energies.*

2.8. Insufficiencies of Quantum Mechanics in Biology

Any belief of the exact validity of quantum mechanics in biology would simply be beyond scientific decency. This is due to the fact that the discrepancies between the predictions of quantum mechanics and the evidence in biology are so large to prevent any attempt at possible reconciliations.

These insufficiencies are also important for the *new energies* because the latter include various biological aspects.

Quantum mechanics is structurally reversible and can represent only perfectly rigid systems, as is well known. As a consequence, the assumption of quantum mechanics in biology would imply that our body is perfectly eternal and perfectly rigid, without any possibility of introducing *ad hoc* parameters or other schemes that could resolve the occurrence.

To begin, one of the pillars of quantum mechanics is the verification of total conservation laws, for which Heisenberg's equation of motion became established. In fact, for an arbitrary quantity A we have

$$i\, dA/dt = AH - HA \qquad [2.8.1]$$

where H is the total energy, for which $i\, dH/dt = HH - HH \equiv 0$.

One of the fundamental needs for a scientifically credible representation of biological structures is instead that of the *time-rate-of-variations of physical characteristics* such as size, weight, density, etc. In fact, unlike atomic systems for which quantum mechanics was built, biological systems age, thus changing in time.

The irreconcilable incompatibility between the *variations in time* of biological structures and the *conservation in time* of quantum mechanics systems as per Eq. [2.8.1] is beyond any credible doubt.

When passing to more specific cases, the insufficiencies of quantum mechanics appear even more forcefully. As an example, quantum mechanics can represent well the shape of sea shells, but not their *growth in time.* In fact, computer simulations have shown that, when the geometric axioms of quantum mechanics are imposed as exactly valid [those of the Euclidean geometry], the sea shell first grows in a deformed way and then cracks during its growth [see Ref. {3f}].

The latter results should not be surprising, again, because the growth of a sea shell is an *irreversible* process while the geometric axioms of quantum mechanics are perfectly reversible, as indicated earlier.

In summary, I hope to have shown in the preceding sections that the insufficiencies, limitations and consequential "incompleteness" of quantum mechanics postulated by Einstein, Podolsky and Rosen {5a} in 1935 begin to emerge in the hydrogen and helium atoms, and then grows with the increase of the complexity of the systems considered, to such a level that the claim of exact validity of quantum mechanics for biological structures implies leaving the boundaries of science.

3. CONCLUDING REMARKS

3.1. Statement of Objectives

The numerous insufficiencies of nonrelativistic and relativistic quantum mechanics in various fields outlined in the preceding sections have a preliminary value for new energies.

The reason is well known to experts. Physics is a discipline which admits its reduction to ultimate and primitive formulations known under the name of *relativities*, and their space-time symmetries known under the name of *rotational, Lorentz and Poincare symmetries.*

The incompatibilities between the new energies and Einstein's relativities are, by far, the most important aspect of this Paper I.

3.2. Insufficiencies of Special Relativity

At a first scrutiny, it appears that the special theory of relativity[10] is *exactly valid* in the arena of its original conception, as clearly identified in the limpid writings of the Founders. It is that of particles which can be well approximated as being point-like when moving in empty space [vacuum] under action-at-a-distance interactions. The relativity is verified on a daily basis in several particle accelerators around the world which provide the ideal conditions of applicability of the relativity.

Numerous authors disagree with the above view [*e.g.,* H.E. Wilhelm {12b} and quoted references] and claim that special relativity is invalid even in the arena of its original conception. In essence, it is now rather universally admitted that the propagation of electromagnetic waves requires that the vacuum [also called universal substratum or ether] is a physical medium, that is, a medium possessing physical characteristics such as rigidity.

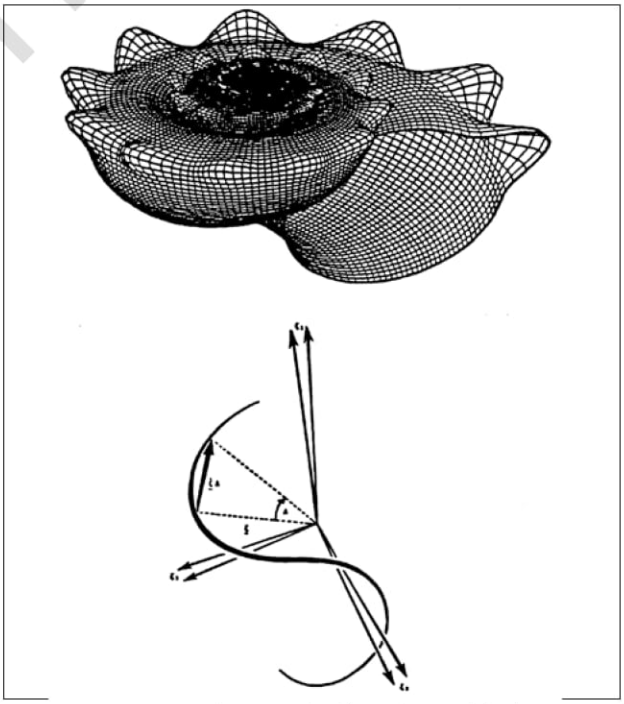


Figure 9: A computer visualization of the shape of a sea shell, the *Angaria delphinium* from Ref. [3f] based on the geometric axioms of quantum mechanics, those of the Euclidean geometry. As one can see, the representation is rather accurate. Nevertheless, the same visualization becomes grossly in contradiction with evidence when extended to the *growth in time* of the same sea shell. The correct representation of the growth requires a 3x3-dimensional space, *i.e.,* the doubling of our conventional Cartesian coordinates which, as such, is multivalued. But this mathematical representation has to be compatible with our 3-dimensional *perception* of the sea shall. This basic task is fulfilled by the hyperstructures indicated in Paper II (see monograph [3f] for details).

New Energy Times Archive

Wilhelm's generalized electrodynamics and quantum mechanics based on a preferred cosmic reference frame remove all inconsistencies known for an observer in a Lorentz covariant physics {12b,12c}.

The naive objection of the past century on the "ethereal wind" [namely, the "wind" experienced by Earth in its motion within the expected universal medium] is easily resolved because elementary particles which compose a body are themselves oscillations of the ether. Thus, when we move a body, we move absolutely nothing remotely resembling a solid. We merely move the oscillations of the ether characterizing particles from one region to another of the medium, thus implying lack of any possible "wind."

In turn, the admission of the vacuum as a universal physical medium requires the existence of a *privileged reference frame* which, as is well known, is against the basic axioms of the special relativity.

A fundamental problem is therefore the *generalization* of special relativity into a formulation which, while preserving the current experimental verifications, admits a universal, privileged, reference frame, that of the universal substratum.

An aspect important for *new energies* which has raised increasing problems of scientific ethics is the ongoing extension of the validity of the relativity dramatically beyond those of its original conception, up to the contemporary claim of universal validity of the relativity for all conceivably possible relativistic conditions existing in the universe, without a serious critical scrutiny and by refusing even to inspect dissident experimental information {2}.

The above controversy is deeply dependent on the historical distinction between:

1] *the exterior dynamical problem*, consisting of point-like particles moving in vacuum, and

2] *the interior dynamical problem,* consisting of extended, nonspherical and deformable particles moving within a physical medium.

It is easy to see that the arena of exact validity of special relativity is that of the exterior problem, while the conditions of its inapplicability [as per Definition 2.1.1] are those of the interior dynamical problems.

The reasons for the above conclusion are rather numerous, such as {12d}:

a] Special relativity can only represent perfectly rigid and perfectly spherical particles, as is well known,[11] while particles in interior conditions are extended, nonspherical *[say, spheroidal] and deformable,* thus implying the inapplicability of the physical foundations of relativity for the interior problem.

b] *The interactions of interior dynamical problems are variationally nonselfadjoint (i.e.,* they violate the conditions to admit a Lagrangian or a Hamiltonian], while special relativity can only represent potential forces by conception, thus implying the inapplicability of the analytic foundations of the theory;

c] *The topology of interior problems is strictly nonlocal,* [*e.g.,* extended over a finite volume], while the topology of special relativity [*e.g.* the Zeeman topology of the Minkowski space] is strictly local [*i.e.,* solely applicable to a finite sumner of isolate points], as is well known, thus implying the inapplicability of the mathematical foundations of relativity; and other reasons {11c}.

All the insufficiencies of quantum mechanics identified in the preceding sections are insufficiencies of special relativity, and this identifies the political reasons why these insufficiencies are not openly treated in the orthodox literature [*e.g.,* those of major physical societies].

As a specific example, the "historical hypothesis" on the deformability of the charge distribution of nucleons when members of a nuclear structure [Fig. 3] was identified at the very birth of nuclear physics, as recalled earlier.

Despite its transparent plausibility and the real possibility that it allows the exact representation of total nuclear magnetic moments [as recently established], the historical hypothesis has been opposed by the establishment in nuclear physics, at times with hysterical acts aimed at the suppression of its direct experimental verification {2a}.

Why have otherwise distinguished scientists risked their career to oppose, discredit and jeopardize such a manifestly basic scientific problem? Because the "historical hypothesis" is irreconcilably incompatible with Einstein's special relativity. That is why. In fact, extended, nonspherical and deformable particles are outside any dream of remote representation via the pillars of relativity, the rotational Lorentz and Poincare~ transformations.

Moreover, there has been the emergence of clear experimental evidence within the same orthodox community which is also irreconcilably incompatible with special relativity, among which we quote :

A] *Speeds bigger than the speed of light in vacuumhave been experimentally established* {13} *and are nowadays physical reality, in disagreement with the celebrated "principle of universal constancy of the speed of light."*[12] In fact, recent experiments have established the existence of photons propagating through certain guides at speeds bigger than that of light in vacuum [called *superluminal speeds*]; large masses in astrophysical explosions have been measured several times at speeds bigger than that of light in vacuum. These and and other experimental evidence establish that the speed of light is only a political barrier in academia but not in physical reality.

B] *Additional experiments have established departures from the relativistic law of time contraction* $\tau = \tau_o\,[1 - v^2/c_o^2]^{-1/2}$ {14} .These experiments deal with the measure of the behavior of the mean lives of unstable particles with speed and other events.

C] Experimental data for the Bose-Einstein Correlation and Condensations can only be fit with unknown parameter [one of them is euphemistically called the "chaoticity parameter"] which in reality characterize the deviations from the basic axioms of the theory {15} [in this case, that of expectation values, see Paper III for details and references].

As we shall see, all new forms of energies as per Definition 1.2.1 constitute interior dynamical problems. As such, on rigorous scientific grounds, Einstein's special relativity is "inapplicable" [and not "violated"] for *new energies,* because the inapplicability of relativity for the interior conditions considered is beyond any possible doubt.

3.3. Inconsistencies of General Relativity

Some [but not all] researchers in *new energies* may believe that gravitation has nothing to do with their field. I disagree. The resilience of academic interests against basic advances is legendary. The moment orthodox physicists are exposed to experimental evidence of simply incontrovertible nature surpassing special relativity, rather than abandoning beloved theories, they will immediately claim that the insufficiencies rest on the flat character of space-time and that the transition to the *general* relativity [see *e.g.,* Ref. {16a}) will resolve all problems.

It is, therefore, essential for researchers in *new energies* to have some awareness that, while special relativity at least possesses some clear conditions of physical applicability and an axiomatic structure of unquestionable consistency, the general theory of relativity has been, by far, one of the most controversial theories in the history of science, with such a large number of basic problems to constitute a scientific religion, rather than a true science, thus raising some of the most serious problems of scientific ethics and accountability {2}.

After studying the issue on technical grounds for three decades, I became convinced that the *general theory of relativity is fundamentally flawed and physically inconsistent.* One of the [too many] reasons is the following property proved in memoir {3d}:

New Energy Times Archive

THEOREM 3.3.1: All physical theories with non-null curvature do not possess invariant units of time, space, energy, etc., and, therefore, they cannot be applied to experiments in any physically meaningful way.

Readers can easily see the roots of the occurrence. The transition from the Minkowski metric = $[m_{\mu\nu}]$ = Diag. [1, 1, 1, −1] to the Riemannian metric $g_{\mu\nu}[x]$, $\mu, \nu = 1, 2, 3, 0$, $x = [r, x^o]$, $x^o = c_o t$, is necessarily characterized by a noncanonical transform at the classical level and by nonunitary transforms at the operator level [because the original metric is not preserved by assumption]. But noncanonical and nonunitary transforms do not preserve the basic units by their very conception. The lack of any possible physical meaning of general relativity then follows.

As a concrete example, the actual measurement of a length is not consistently possible via general relativity because the length of a stationary meter varies in time. The manipulation hurriedly put forward by orthodox physicists is that the entire universe changes jointly with the meter, thus permitting consistent measurements. This manipulation is easily dismissed as such. In fact, general relativity is a local theory which, as such, cannot possibly be applied to a far away galaxy or quasar. No meaningful measurement of the distance of a far away galaxy is therefore possible for a local observer on Earth whose stationary meter changes in time. The same applies for all other measurements.

. . .one can easily see the reasons why all attempts at unified theories with Einstein's gravitation have failed, beginning with the unsuccessful efforts conducted by Einstein himself and a *plethora* of followers.

Theorem 3.3.1 essentially rules out the use of all possible curved spaces for any physically meaningful application. I should indicate here that Theorem 3.3.1 merely formalizes known basic inconsistencies of the notion of curvature.

As an example, it is well known since the early part of this century (although the information has been carefully suppressed in the orthodox literature], that *general relativity predicts a bending of light in a gravitational field which is twice that experimentally detected.* The first bending is due to the notorious claim that "curvature bends light." The second bending is due to the fact that light carries energy which is notoriously attracted by any gravitational field, whether flat or curved.

Equally known [and suppressed] is the impossibility for general relativity to represent the free fall of bodies in a gravitational field. On one side, general relativity reduces gravitational attraction to *curvature,* while on the other side the free fall occurs along a *straight line.* The very notion of gravitational attractions along radial directions is therefore outside the representational capabilities of general relativity.

All these inconsistencies see their climax in Einstein's conception of gravitation, which reduces the gravitational field in the outside of a massive body with null total charge and magnetic moments to pure curvature, that is, to a pure Riemannian metric $g_{\mu\nu}[x]$ characterized by the field equations without source {16a}

$$G_{\mu\nu} = R_{\mu\nu} - 1/2\, g_{\mu\nu} R = 0 . \qquad [3.3.1]$$

The independent inconsistencies of the above conception of gravitation are truly serious and numerous, such as:

I] Theory [3.3.1] can be easily proved to be noncanonical at the classical level and nonunitary at the operator level. As such, it admits no invariant numerical prediction, thus being deprived of any possible real physical content {3d}.

II] Theory [3.3.1] is irreconcilably incompatible with the primary electromagnetic origin of mass {16b}. In fact, the mass of all particles, whether charged or neutral is of primary electromagnetic nature, as is well-established in particle physics {8}. Therefore, all particles admit an electromagnetic field $F_{\mu\nu}$ in their outside with an energy-momentum tensor $T_{\mu\nu}$ which is of first-order in magnitude, which is against the null value of the right hand side of Eqs. [3.3.1]. Ref. {16b} established this to be the case also for neutral particle such as the π_o meson.This inconsistency is so strong that, either one accepts EinsteinŸs field equations [3.3.1], in which case one must reconstruct particle physics from its foundations [the electromagnetic interactions], or one accepts contemporary particle physics, in which case Eqs. [3.3.1] must be abandoned.

III] Independently from the above, field equations [3.3.1] are incompatible with the *forgotten Freud identity* {16c}. The history of this identity alone is per se unreassuring and self-qualifying for the ethical condition of the field. The Riemannian geometry was born with *five* basic identities, all known by the early part of this century. Rather mysteriously, these identities have been reduced to *four,* as claimed in virtually the entire literature in gravitation of this century [see *e.g.,* Ref. {16a}]. The unreassuring aspect is that, in his celebrated book on special and general relativity, Pauli {16d} identified the fifth identity by Freud in all details with various comments, as everybody can verify. Now, every word stated by Pauli has been studied by countless scholars in extreme details. Even ignoring Freud's original work {16c} and other quotations of the early part of this century, the idea that Pauli's treatment of the Freud identify could escape the attention of all subsequent physicists has no credibility whatever, not even remotely. Despite that, the Freud identity has been systematically suppressed in all orthodox literature of this century. The reader is encouraged to visit a scientific library and scan the index of all available textbooks in gravitation to discover no mention whatever of the Freud identity, including the celebrated textbook {16a}. What is the credible reason of the unusual absence of a basic geometric identify in presentations that are claimed to be as comprehensive as possible? The most plausible reason is that *the Freud identity of the Riemannian geometry is incompatible with Einstein's conception of gravitation according to Eq.s [3.3.1]* and, as such, it was trashed. In fact, the Freud identity does reproduce the left-hand-side of Eqs. [3.3.1], but requires the presence in the right-hand-side of two tensors, in evident disagreement with Einstein's field equations [3.3.1]. Note the compatibility of the need for a source tensor from the Freud identity in full agreement with preceding need II.

IV] A rather long list of additional, independent inconsistencies of Eqs. [3.3.1] have been identified by H. Yilmaz over three decades of research [see Ref. {16d} and quoted literature]. This additional case too is unreassuring and self-qualifying for the ethical condition of the sector. In fact, to my best knowledge, Yilmaz's inconsistencies have remained unaddressed by all orthodox physicists [despite their public support...]. I here list some of the inconsistencies Yilmaz published in various refereed journals: a] *Einstein's general relativity is incompatible with the special relativity*, because, contrary to popular belief, the Minkowskian limit of total conservation laws as characterized by Eq.s [3.3.1] only yields the conservation of the total mass and not of the total four-momentum; b] *Einstein's gravitation is incompatible with Newtonian mechanics* because, also contrary to popular belief, the Euclidean limit of Eqs. [3.3.1] *is not* Newtonian mechanics, but rather Hooke's mechanics [this is a mechanics in which the Sun has infinite inertia, thus violating the principle of action and reaction]; c] *Einstein's gravitation is incompatible with experimental tests in gravitation* because, also contrary to popular beliefs, Eqs. [3.3.1] do indeed represent the 43" correction in the advancement of the perihelium of Mercury, but they miss the much more important Newtonian term of 532"; d] *Einstein's gravitation was conceived to be a*

New Energy Times Archive

one-body theory [representing the motion of one body in a gravitational field], thus being unable to represent many-body systems for various technical reasons; e] *Einstein's gravitation is incompatible with quantum mechanics,* for numerous reasons, such as the fact that the former admits a Hamiltonian identically null, while the latter requires a non-null Hamiltonian for any consistent formulation.

V] Einstein's gravitation is incompatible with other interactions for matter and, independently, for antimatter {16f}. In fact, Einstein's gravitation is incompatible with the electromagnetic and strong interactions *for matter* because the latter verify the fundamental Poincare symmetry, while the former does not. Huge independent inconsistencies occur for *antimatter* because antimatter is solely treated via negative-definite energies for electromagnetic and strong interactions, while field equations [3.3.1] solely admit positive-definite energies. The quantization of classical "antiparticles" characterized by positive energy then cannot possibly yield an antiparticle, but merely a particle with the reversed sign of the charge {9b}. Under these premises, one can easily see the reasons why all attempts at unified theories with Einstein's gravitation have failed, beginning with the unsuccessful efforts conducted by Einstein himself and a *plethora* of followers.

Also significant is the fact that all attempts at the achievement of a *quantum mechanical description of gravitation* conducted throughout this century have failed because of a host of fundamental inconsistencies. The identically null value of the Hamiltonian for Riemannian gravitation mentioned earlier is only one of them. Additional serious problems are given by the impossibility to reach particle properties equivalent to those of physical reality, the lack of a well defined notion of observability via Hermiticity preserved at all times, lack of consistent conjugations, such as the CTP theorem, and others.

As a result, the scientifically important issue nowadays is the identification of the *generalization* of quantum mechanics which allows a consistent representation of *gravity,* a topic in which I have spent a number of years of my research life.

By no means does the above list exhaust all major inconsistencies of general relativity. In fact, the lack of scientific ethics and accountability in gravitation {2c} reach their climax for interior gravitational problems {16g}.

The entire theory of gravitational collapse, black holes, Big Bang and all that has been constructed under the *tacit* belief that the Riemannian geometry is *exactly* valid for the interior physical conditions of gravitational collapse.

However, a star undergoing gravitational collapse is not made up of ideal isolated points [as necessary for a mathematically and physically consistent application of the Riemannian geometry], but rather of hyperdense extended hadrons in conditions of total mutual penetration and compression in large numbers into small regions of space. The idea that a geometry, such as the Riemannian geometry, solely conceived for the description of one massive point moving in vacuum, could exactly describe the indicated conditions of gravitational collapse is so farfetched as to constitute a pure, nonscientific, religious belief. In fact, the above interior conditions imply the need for the most general possible geometry which is irreversible in its geometric axioms, nonlinear in the *velocities* and wavefunctions, and nonlocal, thus being dramatically different than the rather simplistic Riemannian geometry.

Additional critical examinations of general relativity, which are also regrettably ignored by organized interests in the field, are those by G. H. Keswani {16h} who has shown that Einstein made a number of errors in the calculations of the shift of the perihelion of Mercury, which should be 43 seconds per terrestrial century, while it is in reality predicted by general relativity to be 108 seconds [see Ref. {16h}, p. 293 for the calculations as well as for other problematic aspects].

The above disagreements should not be surprising for experts in general relativity independent from organized interests in the field. In fact, the gravitational equations are highly *nonlinear,* thus not solvable in a unique and unambiguous way. The solutions then depend on the assumed approximation, resulting in a religion, rather than in a real science with dramatically different and incompatible results, such as the claim throughout this century by leading "experts" that the precession of the perihelion of Mercury is a clear "experimental verification of the general relativity," as compared to the valid and plausible proof by Kaswani that this is not the case {16h}.

The fervor of organized interests then reaches its climax when the above structural weakness of general relativity are exploited for personal gain. A first example is the political exploitation everybody can see in the newsmedia of S. W. Hawking's unfortunate illness to launch his early work on singularities [with R. Penrose] as a new cosmology, while ignoring the oceanic insufficiencies of the background Riemannian geometry for interior gravitations at large, and gravitational collapse in particular.

Another unreassuring example [among too many for comfort] is the exchange between of I. Shapiro of Harvard University and H. Hilmaz [see the various contributions in Ref. {16i}][13], in which the latter accused the former of having intentionally manipulated the above freedom in selecting the approximation of Einstein's field equations and manipulating experimental data to make them fit the beloved theory, while refusing to release detailed theoretical elaborations and experimental data [for the record, I. Shapiro was openly accused of that also by other physicists, including formal accusations in scientific meetings].

But a basic law of academia is that the higher the service rendered to organized interests, the higher is the reward. Following the above internationally known accusations, I. Shapiro was promoted to director of HarvardŸs Center for Astrophysics, where he perpetrates his scientific obscurantism for personal gains to this day in a totally unperturbed way, again, due to complete backing from the political, governmental and newsmedia sectors.

As far as I am concerned, I am solely interested in the laborious pursuit of new scientific knowledge without any interest, not even minute, in a career within such an equivocal academic world. As such, my only desire is to keep a distance as kilometric as possible from Cambridge, U.S.A. or Cambridge, England.

In conclusion, when researchers in new energies are approached by orthodox physicists who claim that insufficiencies at the relativistic level should be resolved at the gravitational level, I suggest simply *to walk away,* because such a claim is so dishonest as not to warrant an answer.

For these reasons real research on really basic open problems of contemporary science is solely conducted nowadays outside academia, thanks to a novel and potentially historical support by industry which recognizes the enormous economic and societal implications of these studies. In the final analysis, orthodox physicists have simply cut themselves out of real innovative scientific inquiries.

Acknowledgments: I have no words to express my appreciation and gratitude to Gene Mallove and Leon Toups for permitting this work to see the light of the day. I also wish to thank several colleagues for invaluable technical assistance and suggestions, including H. Wilhelm, P. Glück, M. Carrell, and others.

FOOTNOTES

[1] For comprehensive information on new energies see the Web Site of *Infinite Energy [IE]* http://www.infinite-energy.com and the forthcoming *Proceedings of the 7th International Conference on Cold Fusion,* Vancouver, Canada [1998].

[2] By "quantitative theoretical representation" I mean a representation via a theory which: 1] is mathematically consistent; 2] is in agreement with established physical laws, such as conservation laws, PauliŸs exclusion principle, HeisenbergŸs uncertainties, etc. [until experimentally disproved in clear terms]; and 3] permits numerical predictions which are invariant under the time evolution of the theory itself [as well as other basic symmetries] and which can be verified with experiments.

[3] For instance, while at Harvard I had irreconcilable disagreement with S. Weinberg, S. Glashow and Murray Gell-Mann [see Ref. {2a} for details] on the current quark religion. I believe that the unitary Mendeleev-type classification of hadrons into family has final character, but I do not believe that quarks exist as physical particles in our space-time for reasons we shall review as this aspect is directly relevant for new energies.

[4] It is notorious that official journals of physical societies systematically reject new experimental evidence which is not corroborated by quantitative theoretical studies. Besides denouncing the anti-scientific character of this widespread practice, the best thing we can do to change it is to provide new quantitative theoretical representations of the new experiments [in the sense of footnote 2]. As an explicit example, Murray Gell-Mann is not in a position to accept research which does not possess a quantitative theoretical representation because the research may otherwise imply, directly or indirectly, a violation of established, fundamental physical laws. Therefore, new experimental results generally raise truly basic questions which are generally used as reasons for scientific caution in editorial processing or in public statements by the physics establishment. After having stated that, leniency is no longer warranted, and should be replaced with open denunciations when the same journals reject new experimental discoveries already possessing quantitative theoretical interpretations, as is the case for the studies presented in these papers.

[5] Following a detailed outline of background technical aspects, and by going transparently against my personal interests, in book {2a} and documentation {2b} I denounced by using real names problems of scientific ethics and accountability at Harvard University, the Massachusetts Institute of Technology, the American Physical Society, the Department of Energy and the National Science Foundation. The documented claim is: systematic, diversified and organized obstructions, discreditations and suppressions by the academic-governmental complex of qualified theoretical and experimental studies on the limitations of relativistic quantum mechanics and Einstein's special relativity in face of an ever increasing scientific knowledge, not for point particles moving in vacuum [such as in a particle accelerator], but for extended-deformable hadrons or at mutual distances smaller then their size [such as for the structure of nuclei, hadrons and stars], the latter being precisely the area of primary relevance for new energies, new recycling of nuclear waste and other topics of major importance for mankind. As anticipated in the subtitle in Italian ["Il Grande Grido" which can be translated as "An Outcry in the Wilderness"], my efforts in raising issues of scientific ethics and accountability in the USA have been completely useless to date. In fact, I experienced the almost universal lack of interest on these issues by people from all walks of life, not from top academicians [such as Mrs. Derek Bok, wife of Harvard's President at that time, a lady expert in issues of ethics], top political circles [such as Reagan's and

Bush's Administrations as well as top senators, too numerous to mention here], or top newsmedia [see below], but also from researchers directly affected by the decay, with very few exceptions known to me. As a result, organized interests managed to suppress any review whatever of books {2a,2b} by the U.S. newsmedia [although not abroad]. As documented examples, we had the suppression of *any* review by: *The Boston Globe* and *The New York Times* following individual reception of five copies from five different sources; the *Boston* and *Miami Herald, Time* and *Newsweek* magazines following reception of three copies; dailies in Tampa, Los Angeles, Chicago, Atlanta, etc., etc., etc. No U.S. daily, weekly or monthly publication dared to print even one line of review, evidently to serve organized interests in the academic-governmental complex. The net outcome is that, today, denunciation {2a} and related documentation {2b} are virtually unknown in the USA, while they are known abroad [particularly in the former U.S.S.R.]. The unreassuring aspect is that, precisely as a result of this widespread lack of interest, *problems of scientific ethics and accountability have dramatically deteriorated in the USA since the time of book* {2a} [1984], as I shall indicate in the footnotes of subsequent articles of this series. One of the consequences is the current impossibility of conducting in the US academic-governmental complex professional research in "new," clean energies, "new" forms of recycling nuclear waste, "new" clean fuels, etc., despite horrendous, rapidly escalating ecological problems. I wrote "Il Grande Grido" because I want to keep a distance from a generation that will be unquestionably condemned by its descendants. *Infinite Energy* is doing an excellent job in attempting to contain the problem. Reader, what are YOU doinî? It is written throughout the history of mankind that people have the institutions they deserve. The current widespread decay of scientific ethics and accountability are not the sole responsibility of vested interests in the academic-governmental complex. They are the responsibility of ALL of us, particularly those who supinely accept the *status quo,* whether for inertia or complicity.

6Hadronic mechanics has been studied in over 1,000 papers in various fields, in some 15 monographs and over 40 volumes of conference proceedings for a total of over 10,000 pages of published research.

7Singlet couplings for particles with spin 1/2 [as it is the case of electrons] are referred to the case when the two spin orientations are anti-parallel as necessary in this case from Pauli's exclusion principle, while triplet states refer to the case when the two spins are parallel. The word "singlet" denotes the existence of only one possible total spin, zero. The word "triplet" denotes instead the existence of three possible total spin orientations, +1, 0 and −1.

8See my detailed denunciation on the behavior of various MIT physicists on this issue in book [2a] and the related documentation in Ref. [2b}.

9As the reader may know, current dating via C^{14} of the Sacred Shroud indicate its apparent creation in the 1400s, rather than the expected dating back to Christ's times. The information which is suppressed in these data to render them "scientific results" [apparently done for pre-meditated reasons], is that such a dating is subject to a long list of beliefs. In fact, available datings released by primary U.S. institutions lack the following joint information which is evidently necessary for scientific caution, let alone respect of the religion of others: they do not state the possibility that suitable events may have *stimulated the decay of some of the naturally unstable carbon atoms, with consequential decrease of the actual age;* they do not state carbon dating conducted in certain Egyptian mummies with results in dramatic disagreement with their visible age; and they do not contain additional technical limitation which are generally indicated in other scientific analyses.

10 The theory is politically called "EinsteinŸs special relativity" while the correct scientific name is the *Lorentz-Poincare~-Einstein special relativity* because of well-known and fundamental contributions by Lorentz and Poincare~ *prior* to those by Einstein. For historical accounts on the contributions by Poincare ~to the special relativity, one may consult Ref. {11a}.

11At the classical level and that of first quantization the special relativity can only represent point-like particles, while at the level of second quantization the relativity can only represent via the form factor perfectly rigid and *perfectly spherical shapes* as a necessary condition not to violate a pillar of the special relativity, the rotational symmetry.

12In the spirit of true Founders, Lorentz was one of the first to consider the experimental reality that the speed of light in our atmosphere is smaller than that in vacuum, and made the first attempt to generalize his celebrated symmetry, from the invariance of the speed in vacuum c_o to a smaller speed $c < c_o$. With the advent of "EinsteinŸs special relativity" this beautiful teaching was suppressed in favor of the universal constancy of the speed of light c_o and academic machinations on the representation of lower speeds c via "photons scattering among the molecules of the atmosphere." Physics is a quantitative science which, despite political problems, eventually has always managed to establish the truth. The recent experimental evidence on speeds bigger than that of light in vacuum {13} therefore constitutes a condemnation of one century of suppression of due scientific process on a truly basic physical issue. In fact, the measure of speeds bigger than that of light in vacuum has disqualified as academic manipulations the use of photons scattering among molecules which were imposed via academic power to provide the appearance of salvaging a beloved theory. These machinations never had any credibility because, say, a classical radio wave with one meter in wavelength traveling in our atmosphere at a speed $c < c_o$ simply cannot be reduced in any credible way to photons *in second quantization* scattering among molecules.

13I indicated in footnote[5] the widespread lack of interest on issues of scientific ethics and accountability even by physicists who are damaged by them. Another illustration of this rather unusual occurrence is the fact that the newsletter *Scientific Ethics* of Ref. {16i} was announced via a mailing to all members of the American Physical and Mathematical Societies as well as all members of the American Association for the Advancement of Science, for a total mailing of some 300,000 U.S. addressed [sic], out of which less than ten subscriptions [sic] resulted. Following completion of Vol. 1, the newsletter was terminated.

REFERENCES

1. G. Goldfein reprinted in IE 3, No. 3, p. 78 [1998]; R. Nelson, *Infinite Energy* 3, No. 18, p. 64 [1998] and *Infinite Energy* 4, No. 19, p. 79 [1998] {1a}. G. Mallove, *Infinite Energy* 3, No. 18, p. 11 [1998] and 4, No. 19, p. 11 [1998] {1b}. M. Fleishmann, S. Pons and M. Hawkins, *Electroanalytic Chem.* 261 301 [1989] {1c}. M. Carrell, *Infinite Energy* 3, No. 18, p. 25 [1998] {1d} Patterson Fuel cell web site http://www.biz.onramp. net~ceti {1e}. L.C. Case, *Infinite Energy* 4, No. 19, p. 36 [1998] {1f}. P. Graneau, *Infinite Energy* 13-14, 92 [1997] {1g}. H. R. Taplin, *Infinite Energy* 3, No. 18, p. 15 [1998] {1h}. W. G. Gwinn, *Infinite Energy* 3, No. 18, p. 23 [1998] {1i}. R. Nelson, *Infinite Energy* 3, No. 3, p. 58 [1998] 1j}. R. M. Santilli, *Infinite Energy* 4, No. 19, p. 72 [1998] {1k}. R. M. Santilli, *Hadronic J.* 17, 314 [1994] {1l}.

2. R. M. Santilli, *Ethical Probe of Einstein's Followers in the USA, An Insider's View,* Alpha Publishing, Newtonville, MA [1984] {2a}. R. M. Santilli, *Documentation of the Ethical Probe,* Volumes I, II and III, Alpha Publishing [1985] {2b}. G. F. Weiss, *Scientific, Ethical and Accountability Problems on Einstein's Gravitation,* Andromeda Publ., Bologna, Italy [1991] {2c}. R. Milton, *Forbidden Science: Suppressed Research that Could Change our Lives,* Fourth Estate Ltd, London [1994] {2d}.

3. R.M. Santilli, Hadronic J. 1, 228 and 574 [1978] {3a}; *Elements of Hadronic Mechanics,* Vols. I {3b} and II {3c}, Ukraine Academy of Sciences, Kiev, 2nd ed. [1995]; *Found. Phys.* 27, 25 [1998] {3d}; *Rendiconti Circolo Matematico Palermo, Suppl.* 42, 7 [1996] {3e}; *Isotopic, Genotopic and Hyperstructural Methods in Theoretical Biology,* Ukraine Academy of Sciences, Kiev [1996] {3f}; *Hyperfine Interactions* 89, 110 [1997] {3g}; *Algebras, Groups and Geometries* 10, 273 [1993] {2h}. A. K. Aringazin, A. Jannussis, D. F. Lopez, M. Nishioka and B. Veljanosky, *Santilli's Lie-Isotopic Generalization of Galilei's and Einstein's Relativities,* Kostarakis Publisher, Athens, Greece [1990] {3i}. J. V. Kadeisvili, *Santilli's Isotopies of contemporary Algebras, Geometries and Relativities,* Second Edition, Ukraine Academy of Sciences, Kiev [1997] {3j}. D.S. Sourlas and G.T. Tsagas, *Mathematical Foundations of the Lie-Santilli Theory,* Ukraine Academy of Sciences, Kiev, 1993] {3k}. J. Lofllhmus, E. Paal and L. Sorgsepp, *Nonassociative Algebras in Physics,* Hadronic Press, Palm Harbor, FL, 1994] {3l}.

4. E. Merzbacher, *Quantum mechanics,* J. Wiley & Sons, New York [1961].

5. A. Einstein, B. Podosky and N. Rosen, *Phys. Rev* 47, 777 1935] {5a}. J. von Neumann, *The Mathematical Foundations of Quantum Mechanics,* Princeton University Press [1955] {5b}. R. M. Santilli, Acta Appl.. Math. 50, 177 [1998] {5c}.

6. J.T.F. Barwick, J.Math.Phys. 24, 2776 [1983] {6a}. G. Cavalleri and A. Zecca, Phys.Rev. B 43, 3223 [1991] {6b}. M.A.Morrison, R. W.Crompton, B. C.Saba, and Z. Lj. Petrovich, *Aust. J. Phys.* 40, 329 [1987] {6c}. G. Cavalleri and G. Mauri, *Phys. Rev.B 41, 6751 [1990] {6d}. M.A. Morrison and W.K. Trail, Phys. Rev. A 48, 2874 [1993] {6e}*. S. J. Buckman *et al., Phys. Rev.Letters* 65, 3253 [1990] {6f}. J. Slater, Quantum Theory of Molecules and Solids, Vol. I [1963], Vol. II [1969] and Vol. 4 [1974], McGraw Hill, New York {6g}.

7. E. Fermi, *Nuclear Physics,* University of Chicago Press [191949] {7a}. L. Rosenfeld, *Nuclear Forces,* North-Holland, New York [1948] {7b}. J. Blatt and V. Weisskopf, *Theoretical Nuclear Physics,* J. Wiley & Sons [1952] {7c}. A. de Shalitz and H. Feshbach, *Theoretical Nuclear Physics,* Vols. I {7d} and II {7e}, Wiley & Sons, new York [1974]. A. Kaptari *et al., Phys. Rev.* C 54, 986 [1996] {7e}. L S. G. Bondarenko *et al.,* JINR Comm. E4-95-440 [1995], Dubna, Russia {7f}.

8. M. Kaku, Quantum Field Theory, Oxford Univ. Press [1993].

9. R. M. Santilli, *Ann. Phys.* 11, 383 [1981] {8a} and Hyperfine Interactions 109, 63 [199] {8b}.

10. V. Z. Krezin, H. Morawitz, S. and A. Wolf, Mechanisms of Conventional and High Tc Superconductivity, Oxford University Press [1993].

11. M. W. Hanna, *Quantum Mechanical Chemistry,* Benjamin, New York [1965] {11a}. D. Eisenberg and W. Kauzmann, *The Structure and Properties of Water,* Oxford University Press [1969] {11b}.

12. A. A. A. Logunov, Hadronic J. 19, 109 [1996] {12a}. H. E. Wilhelm, *Hadronic J.* 19, 1 [1996] {12b}; and *Chinese Syst. Eng. & Electr.* 6, 54 [1995] {12c}. R. M. Santilli, *Chinese J. Syst. Eng. and Electr.* 6, 157 [1995] {12d}.

13. A. Enders and G. Nimtz, J. Phys. France 2, 1693 [1992] {13a}. G. Nimtz and W. Heitmann, *Progr. Quantum Electr.* 21, 81 [1997] {13b}. F. Mirabel and F. Rodriguez, *Nature* 371, 464 [1994] {13c}. J. Tingay *et al.,* Nature 374, 141 [1995] {13d}. D. Baylin *et al.,* IAU Comm. 6173 [1995] {13e}. P. Saari and K. Reivelt, *Phys. Rev. Letters* 79, [1997] {13f}.

14. S.H. Aronson *et al., Phys.Rev.* D 28, 495 [1983] {14a}. N. Grossman *et al., Phys. Rev. Lett.* 59, 18 [1987] {14b}. G. Alexander *et al., Phys. Lett. B* 368, 244 [1996] {14c}. F. Cardone, R. Mignani and R. M. Santilli, *J. Phys G.* 18, L61 and L141 [1992] {14d}.

15. R. M. Santilli, *Hadronic J.* 15, 1 [1992].

16. C. W. Misner, K. S. Thorne and J. A. Wheeler, Gravitation, Freeman, San Francisco, U.S.A. [1970] {16a}. R. M. Santilli, *Ann. Phys.* 83, 108 [1974] {16b}. W. Pauli, *Theory of Relativity,* Pergamon Press, New York [1958] {16c}. P. Freud, *Ann. Math.* 40, 417 [1939] {16d}. H. Yilmaz, Hadronic J. 12, 305 [1989] {16e}. H. Rund, *Algebras, Groups and Geometries* 8, 267 [1991] {16f}. R. M. Santilli, *Found. Phys. Letters* 10, 307 [1998] {16f}. R. M. Santilli, *Chinese J. Syst. Eng. & Electr.* 6, 157 [1995] {16g}. I. Kauffman, Editor, *Scientific Ethics,* Vol. 1 [1995].

Biographical Summary of Dr. R. M. Santilli

Ruggero Maria Santilli received his Ph.D. in Theoretical Physics at the University of Turin, Italy, in 1966. He emigrated with his family to the U.S. in 1967 and obtained U.S. citizenship in 1985. He is married and has two adult children, Luisa and Ermanno.

Dr. Santilli has held faculty or visiting positions at: the University of Miami in Coral Gables; Boston University; M.I.T.; the Departments of Physics and Mathematics of Harvard University; J.I.N.R. Dubna, Russia; Ukraine, Romania and Estonia Academies of Sciences; and other institutions. Currently he is Professor of Theoretical Physics and President, Institute for Basic Research, Castle Prince Pignatelli, Molise, Italy with Editorial Offices in Palm Harbor, Florida. He is Honorary Professor of Theoretical Physics, Ukraine Academy of Sciences.

Dr. Santilli has conducted research under support from the U.S. AFOSR, NASA, DOE and EC. He is the author of over 200 research papers published in numerous refereed physics and mathematics journals in the U.S., Western and Eastern Europe, and the Far East. Also, he is the author of 14 advanced monographs (for post Ph.D. research courses) published by Springer-Verlag, Ukraine Academy of Sciences, Balkan Geometry Society, and other publishers.

He has been the editor of 30 volumes of conference proceedings or collected works and was the main organizer of some 18 international meetings in physics and mathematics in the U.S., Italy, France, the former Yugoslavia, Greece, and Russia. He is the founder of the *Hadronic Journal*, now in its 20th year of regular publication, the *Hadronic Journal Supplement*, now in its 11th year of regular publication, and *Algebras, Groups and Geometries*, now in its 14th year of regular publication. He is the editor of five journals in mathematics and physics and a referee for most physics journals.

Dr. Santilli was nominated by the Estonia Academy of Sciences as one of "the most illustrious applied mathematicians of all times," jointly with Gauss, Lie, Riemann, and others for his discovery of structural generalizations of current mathematical, physical and biological theories based on the lifting of the unit which has implied new numbers, new spaces, new algebras, new geometries, new analytic mechanics, new quantization, new operator mechanics, etc. He was the recipient of a number of honors, including two gold medals for scientific merits; the dedication in his name of a hall at an Australian Institute of Research; systematic nominations for the Nobel Prize in Physics by an increasing number of scholars beginning in 1985. There is an *International Committee for the Nobel Prize Nomination of Professor Ruggero Maria Santilli*, the First Chairman (1985-1988) was A.O.E. Arumalu, Dept. of Physics, Univ. of Nsukka, Nigeria; Second Chairman (1988-1993), A. Jannussis, Dept. of Physics, University of Patras, Greece; Third Chairman (1993-), G.F. Weiss, Editorial Manager, *Hadronic J.*, *Hadronic J. Supplement*, *Algebras, Groups and Geometry*. Private address: P. O. Box 0594, Tarpon Springs, FL 34688, USA.

New Energy Times Archive

DETERMINING TEMPERATURE RISE CAUSED BY HEAT SOURCES WITH NATURAL CONVECTION HEAT TRANSFER

Donald Slack

Aqua Environment Inc., P.O. Box 935, San Rafael, CA 94970; Ph: 415-453-8157

The purpose of this article is to provide a relatively simple cook book approach to some natural convection heat transfer problems as might be applicable to cold fusion analysis. For example, it might be desirable to determine expected temperature rise from a heat source when the heat is being carried away by hydrogen gas compared to another gas such as deuterium or helium.

Natural convection refers to heat transfer which occurs in a still, windless atmosphere. Movement of the gas (or liquid) is generated only by the heat source causing warmed gas to rise and thus circulate.

A number of dimensionless parameters are used to correlate and predict this heat transfer.

Prandel number (Pr) combines the properties of a gas that affect heat transfer. Being dimensionless it has the same value regardless of units used (metric, English etc.). It is defined as:

1. $Pr = C_p \mu / k$

where:

C_p = the specific heat or heat capacity of the gas
μ = absolute viscosity of the gas
k = thermal conductivity of the gas

Grashof number (Gr) combines the various parameters that affect heat transfer in natural convection again in a dimensionless number. It is defined as:

2. $Gr = r_o^2\, g\, B\, \partial T\, D^3/\mu^2$

where:

r_o = fluid density
g = acceleration of gravity
B = the inverse of absolute temperature
∂T = the temperature difference or temperature rise
D = the characteristic length of the object being cooled (or heated)
μ = absolute viscosity of the fluid

Nusselt number (Nu) is a more general heat transfer dimensionless number that is used to correlate both natural and forced convection heat transfer. It is defined as:

3. $Nu = hc\, D/k$

where: hc is the heat transfer coefficient number (which has dimensions)

Hc is defined as:

4. $hc = Q/A\partial T$

where: Q = heat transferred
A = heat transfer area
∂T = temperature difference between the gas and surface heat is transferred to or from

Over the last 80 years a large body of empirical data has been gathered relating these numbers to actual heat transfer. This, along with analytical input, has resulted in relationships of these dimensionless numbers that can predict natural convection heat transfer fairly accurately. Equation 5 is for vertical surfaces in natural convection within a range of GrPr values we might expect for a table top experiment. For other shapes and sizes of vessels, Equation 5 and its rearranged form, equation 6, will give only a crude prediction of temperature rise. Also gas properties at the actual operating temperatures should be used. The reader is referred to Reference 1 for more detailed and accurate analysis.

However, when comparing changes in temperature rise (∂T) due to a parameter change such as switching gases, changing gas pressure, or changing heat input, Equations 5 and 6 can be used with more reasonable accuracy. Also ambient temperature gas properties can be used over a wide range of temperatures since properties of different gases change more or less equally with temperature.

5. $Nu = 0.55\, (GrPr)^{0.25}$

Equations 1 through 5 can be combined and rearranged to give temperature rise as a function of other parameters as given in Equation 6.

6. $\partial T = 1.61\; Q^{+0.8}\, D^{+0.2}\, A^{-0.8}\, g^{-0.2}\, B^{-0.2}\, cp^{-0.2}\, r_o^{-0.4}\, \mu^{+0.2}\, k^{-0.6}$

One consistent set of dimensions (Metric) giving temperature rise in degrees K is:

Q	J/s	heat removed
D	cm	characteristic length
A	cm^2	heat removal area
g	cm/s^2	gravity constant = 980 cm/s^2
B	1/K	inverse of absolute temperature
c_p	J/g-K	specific heat of gas
r_o	g/cm^3	density of gas
μ	g/cm-s	absolute viscosity of gas
k	$J/(s\text{-}K\text{-}cm^2)$	thermal conductivity of gas

Simplified Heat Transfer Comparisons

Often we don't need to calculate a temperature rise but only need to know the effect of changing some condition, such as using a different gas. In this case we can simplify the above equation by combining all the unchanging parameters into a single constant, C_1. These include the constant 1.61; g, the gravity constant; B, the inverse of absolute temperature (assuming this doesn't change very much); D, the vessel dimension; Q, heat input; and A, the vessel area. This gives:

7. $\partial T = C_1\, (c_p^{-0.2}\, r_o^{-0.4}\, \mu^{0.2}\; k^{-0.6})$

or ∂T is proportional to $(c_p^{-0.2}\, r_o^{-0.4}\, \mu^{0.2}\; k^{-0.6})$ for a given heat input and vessel geometry.

For example, comparing ∂T when the vessel contains hydrogen with ∂T when the vessel contains deuterium, helium, or nitrogen, we need only substitute the respective gas properties given in Table 1 below into Equation 7. This gives the values in Table 2. Note: The constant C_2 in Table 2 is C_1 of Equation 7 adjusted for the multipliers at the top of Table 1.

Here we see that given the same vessel geometry, the same heat source and the same gas pressure within the vessel, the temperature difference between the internal gas and vessel walls (∂T) will vary with gas used. For example, deuterium will result in a temperature rise 7 or 8% greater than hydrogen (1.20 vs 1.11 times some constant). Since the constant is the same for all gases being compared, we do not need to calculate its value.

New Energy Times Archive

Table 1. Gas Properties at 300K and 1 ATM [2]

	specific heat	density at STP	viscosity	thermal conductivity
	J/(g-K)	$g/cm^3 \times 10^3$	$g/cm\text{-}s \times 10^4$	$J/(s\text{-}cm\text{-}K) \times 10^3$
nitrogen	1.0	1.20	1.79	0.26
deuterium	7.0	0.16	1.26	1.41
helium	5.2	0.16	2.00	1.52
hydrogen	14.2	0.08	0.90	1.81

Table 2. Comparison of Natural Convection Heat Transfer with Different Gases

$\partial T = C_2 \times 2.34$	for nitrogen (or air)
$\partial T = C_2 \times 1.20$	for deuterium
$\partial T = C_2 \times 1.34$	for helium
$\partial T = C_2 \times 1.11$	for hydrogen

Equation 7 above also gives insights on how to vary parameters in an experiment. For example, if we wanted deuterium and hydrogen to have the same heat transfer properties, thus the same ∂T for a given heat input, inspection of Equation 7 shows we might do this by increasing the pressure, thus density, of deuterium. In fact, Equation 7 shows that if the absolute pressure, thus density of deuterium, is 20% greater than hydrogen heat transfer, properties of the two gases would be more or less equal. The gas properties in Table 1 other than density vary only slightly with pressures up to several atmospheres.

Here we have simplified the heat transfer analysis to look at only relative changes when changing parameters . We need not be concerned with absolute numbers of the constants C_1 and C_2. However, units of the difference variables must be consistent. For example, the density of different gases can be in mg/cm^3 or they could be in $lb./ft^3$, so long as the same units are used for the gases being compared. Other comparisons can be made. For example, Equation 6 shows ∂T is proportional to $Q^{0.8}$ in natural convection heat transfer.

Example of Analysis as Applied to a Cold Fusion Catalytic Cell Experiment

Vol. 4, Issue 19 (April/May 1998) of *Infinite Energy* magazine discussed a catalytic fusion experiment by Dr. Les Case. Here a comparison of temperature rises was made between tests when the cell was heated first with hydrogen gas, then with deuterium gas. The object was to see if deuterium reacted with a catalyst in the vessel producing heat, whereas hydrogen did not. By observing a greater temperature rise with deuterium, it was suspected that an heat-generating reaction occurred. The above heat transfer analysis can be used, assuming constant heat input to roughly determine the temperature rise caused by the lower heat transfer properties of deuterium compared to hydrogen.

First it is observed that Dr. Case measured temperature rise between the vessel interior and ambient air around the vessel. This means there are two ∂T's involved.

a. ∂T between the interior gas and the vessel wall.
b. ∂T between the vessel wall and the outside air.

Considering the internal ∂T, it is noted that the only change during his tests was in gas properties. The vessel area, and other variables in Equation 6 were unchanged. Assuming gas pressures were the same, we see from Table 2 that:

∂T internal with hydrogen $= C_2 \times 1.11$

∂T internal with deuterium $= C_2 \times 1.20$

The external ∂T heat transfer gas was air in both tests, so gas property variables of Equation 6 were the same for both tests. Also the internal and external area of the vessel is about the same. The characteristic length D of Equation 6 may be different outside the vessel than inside and we have to take an eyeball guess at this. Fortunately, Equation 6 shows ∂T is affected only by the 0.2 power of D, so an error in this estimate should not greatly affect the estimate of ∂T. We will assume D internal is equal to D external and thus drop it from our comparison. Thus we see from Table 1 that:

∂T external $= C_2 \times 2.34$

Consequently if the heat input Q is the same for both tests (the test with hydrogen and the one with deuterium), the total ∂T between the interior of the vessel and the ambient outside temperature as measured by Dr. Case should be:

∂T total with hydrogen $= C_2 \times (1.11 + 2.34) = C_2 \times 3.45$

∂T total with deuterium $= C_2 \times (1.20 + 2.34) = C_2 \times 3.54$

Dr. Case, when running his test in Bow, New Hampshire, noted a temperature rise of about 160 K with hydrogen in the vessel for a fixed heat input. From the above comparisons we might expect the total temperature rise with deuterium in the vessel with the same heat input to be:

$160 \times 3.54 / 3.45 = 164$ K rise with deuterium in the vessel

This ∂T is 4 K greater than with hydrogen in the vessel. If the observed ∂T is substantially higher that 4 K, we might suspect the presence of another heat source.

This is a rather simplified estimate giving a somewhat better than order of magnitude accuracy. A more accurate analysis would involve the effect of radiation heat transfer, the effect of internal and external shape of the vessel, the way heat from the external heating bands enters the vessel then exits the vessel through its upper, exposed surfaces, etc. Although rough, an analysis such as this also gives insight to the problem and suggests ways to do calibration runs. For example, as suggested above, increasing deuterium pressure can make its heat transfer properties more or less equal to hydrogen. Test runs with deuterium and no catalysts would eliminate the variable of different gas properties.

Note : Dr. Case has reported substantially higher ∂T than the 4 K calculated above and he has reported doing some of the above-mentioned calibration experiments. Thus his work looks promising at this point.

References

1. Kreith, Frank & Bohn, Mark, *Principles of Heat Transfer*, West Publishing Co., St Paul, MN ISBN 0-314-01360-1, Fifth Edition, pg. 315-340.

2. *Handbook of Chemistry and Physics*, 73 rd Ed. (92-93) CRC Press Inc., ISBN-0-8493-0473-3 (sp. heat - pg. 5-79; viscosity pg. 6-164; thermal cond. pg. 4-147).

About the author: Don Slack received his Masters Degree in Mechanical Engineering from the Univ. of Michigan. He has been the President of Aqua Environment Co. since 1973.

He was an engineer at Lawrence Livermore National Laboratory from 1979 to 1993; from 1980 to 1986 he was in charge of the Mirror Fusion Test Facility (MFTF) cryogenic systems.

Until 1973 he developed gas maintenance and life support equipment for industry and the Navy. Included in equipment he designed are helium/oxygen gas mixers and cryogenic helium recovery systems. He is a registered mechanical engineer in California, holds four patents, and has authored numerous publications in the fields of cyrogenics, pneumatic systems and life support systems.

New Energy Times Archive

KINETOBARIC EFFECT AS POSSIBLE BASIS FOR A NEW PROPULSION PRINCIPLE

W. Peschka from *RAUMFAHRT-FORSCHUNG*, Feb., 1974 *Translated from German by Donald Reed*

Don Reed has a Master of Arts degree in mathematics and a background in physics and electrical engineering, and has taught mathematics at both the high school and college levels. Over the years he has had an abiding interest in fundamental theories of the universe and has also pursued a search in the field of non-conventional and advanced energy technology for the last 25 years. He has been published in many journals, such as *Energy Unlimited, Extraordinary Science, Journal of New Energy, Space Energy Journal, Speculations in Science and Technology,* and has authored a chapter in the recent book *Advanced Electromagnetism: Foundations, Theory and Applications,* published by World Scientific in 1995. He also has had several papers printed in the Proceedings for various conferences on non-conventional energy technology.

Introduction

A report is given on experimental investigations originally made by R.G. Zinsser. In this work the existence of a new type of dynamic effect on bodies has been found. As the result of experimental investigations, these dynamical effects can be considered to be well established. The prospect of having a possibly new phenomenon offered cause and justification to continue this work in order to derive further experimental facts.

Principle of the Experiments

The tests carried out made use essentially of a basic tuned resonant electrical circuit, essentially of inductance and capacitance, for example the quarterwave high frequency circuit represented in Figure 1. This resonant circuit is positioned (immersed) in water (conducting water or salt water). This arrangement thus forms part of a container-sample made of insulating material. It appeared that, in this connection, water is not exclusively required to produce these effects. The advantage in the use of water lies in its high dielectric constant, by means of which comparatively minute test measurements on the sample become feasible, under the consideration for the attainment of frequencies and wavelengths through its utilization. Amongst other manifestations which this frame is capable of bringing about is inductive or capacitive coupling of dynamic force effects. These experiments underlie a new power source. The detection of such dynamic effects by the use of these tests was relatively small (force in the range of 1 to 10 dynes), which the sample exerts on the corresponding sensitivity of the torsion balance (TB).

Description of the Torsion Balance and the Measurement Apparatus

A TB was in suspension (the suspension wire was secured from material influence)—Figure 2. The composition of the TB as well as the entire moveable section is not paramagnetic or ferromagnetic, but consisted substantially of aluminum and brass. The suspension is of pure .3 mm steel wire. The whole TB is itself contained in a housing secured from influence of outside air currents, electrostatic, as well as magnetic influence by corresponding arrangement, where no interfering effects occur which are of the order of magnitude that the expected effects attain. Above the driving system of the TB is situated a lighting system alignment, revolving mirror, and recording device. The recorder is constituted of a photocell apparatus, intermediate to which passes a light beam. The light path measures 7m. The sensitivity of the TB - relative to the recorder - measures 25 dyn/cm for a 7m light path. The TB was suitably oiled and periodically damped. The undamped oscillation period measured about 120 sec. Figure 2 illustrates the significance of the following elements: P = sample, G = weight, S = rotating mirror, D = damping oil, L = flexible suspension, B = recorder, s = light path.

The coupling of high frequency was capacitive via air capacitors situated in the sample attached to the TB (in specific tests inductive coupling was also employed). The high frequency (H-F) supply unit voltage amounted to 10 volts RMS. The input power was in the region of from 20 microwatts up to a few 100 milliwatts. The production of input H-F was from a push-pull oscillator, which can be utilized to modulate a push-pull power amplifier. While it is customary that full amplification is not

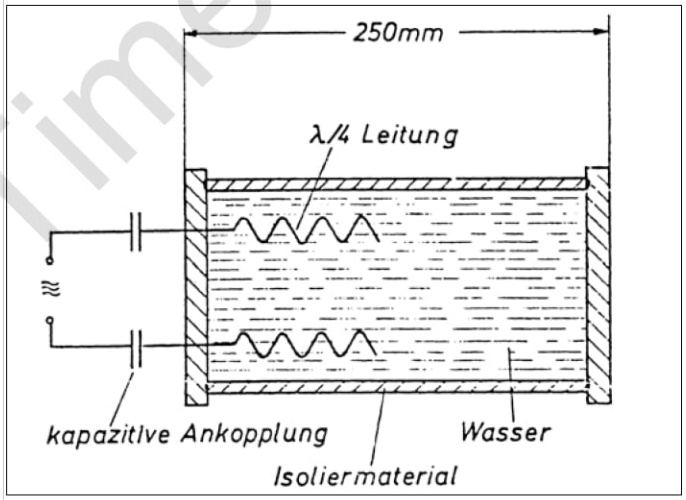


Figure 1. Diagram of the employed sample probe.

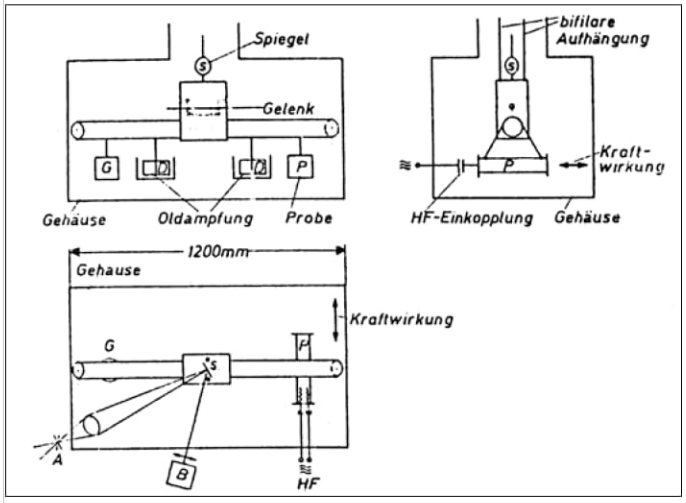


Figure 2. Diagram of the torsion balance apparatus. P = sample, G = weight, S = rotating mirror, D = damping oil, B = recorder, A = lightsource.

New Energy Timeline Archive

employed, only part of the H-F which the oscillator attains in the test apparatus is higher than the full amplification of the capacitor grid plate (voltage damping factor is around 100 to 200). The full power of the final amplification of the push-pull amplifier is around 20 to 50 watts. By utilization of the power output, which can be implemented by the present method, no further augmentation of the effect can be detected (saturation effect). Accordingly, for the most part, the tests were conducted without the power amplifier, and therefore very negligible standard power output was conveyed. The frequency measurements were taken with an 8-digit frequency meter.

Implementation of the Apparatus

At first in 1970 two TB's finished undergoing extended neutral operation (Null-Laufen) - that is, with no H-F excitation applied. There was no affect from temperature deviation to movement of the apparatus framework. The latter was controlled by an electronic spirit level on a precise second of arc. Likewise ruled out were electrostatic effects (stray sparking discharges were taken care of by insulating sections with high voltage from a 15KV transformer, with corresponding modifications to allow no kind of excessive feedback effects). Furthermore, there is no detectable influence from outside magnetic fields. To this end, the whole apparatus was surrounded with a magnetic coil generating an intensity of about 100 times the horizontal intensity of the Earth's magnetic field. Also, there was no influence from the solid foundation of the TB.

Investigation of influence from air motion on the deflection of the TB demonstrated that the greatest influence from thermal turbulence occurred when the balance casing contained a large volume. Accordingly, after decisive experimentation, the balance was surrounded by the least possible spacing, specifically selected whereby the existing sensitivity of the TB to the influence of air turbulence has been practically entirely eliminated. Also, it should be remarked that this balance was proven to be a remarkably reliable measuring instrument. The TB had a feature of high sensitivity in regards to large-scale measurements, but practically negligible sensitivity to outside mechanical disturbances, in a manner similar to a galvanometer, for example. There was a further observation that the balance sensitivity is minor to a factor of 10^{-3} to 10^{-4}. This pertained to both balance 1 and balance 2 (the Eötvos balance), which can be made to function impeccably on this basis, only in a very high vacuum.

Subsequently, according to this arrangement, the neutral operation (Null--Laufe) of the TB was guaranteed and the second balance was situated in the same apparatus in another section of the structure, in order to begin carrying out the experiment. The water in the probe was evacuated of air—especially conducting water, but also salt water at room temperature in the sample—by means of a water jet pump. Thus, the water remains in the enclosed sample during a whole test period, in general length of from four to six weeks. To begin with, the sample was secured to the TB and activated by the H-F supply source for a period of general length of one to two minutes. In a few cases this activation was repeated several times, pausing repeatedly for a few minutes. The power fed to the sample amounted generally to around 20 microwatts to 100 milliwatts. In the course of approximately three years, 200 tests were run. Most of these tests would be terminated after two days. Approximately 12 tests would be taken over a long period (six or eight weeks). According to these tests, the two balances performed with a ballast weight. The Eötvos balance, due to its high sensitivity, insured that there were no influences from outside vibrating structures such as tectonic processes, tidal influences, etc.

Test Findings

1. Supplying suitable H-F energy to the sample results in a force effect on the sample. The measured reaction on the TB was a force in the area of 10 dyn (Figures 3, 4). It is supposed that progressively greater forces can appear, such as those from the measurement records of R.G. Zinsser, according to which in rare cases forces of up to 1500 dyn. over many hours were observed. The employment of specific frequencies had to be

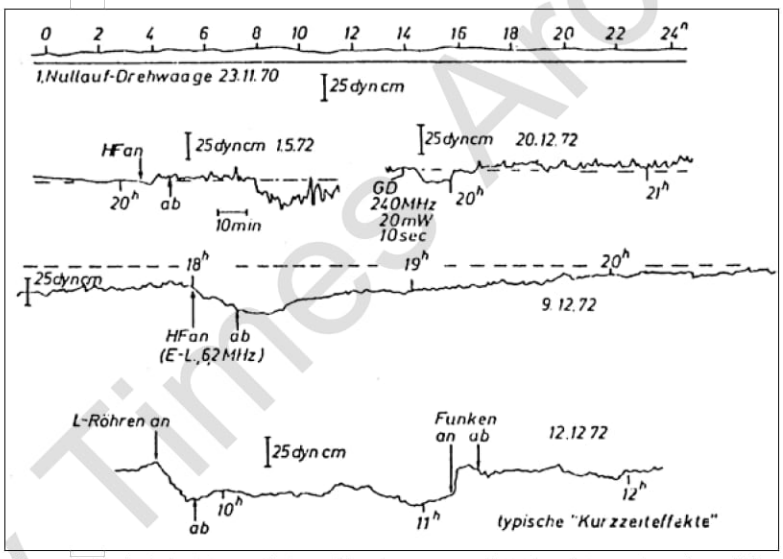


Figure 3. Typical short-time effect resulting from source H-F. The distance from the null-line corresponds to the deflection of the TB. The source H-F results partly from a corresponding oscillator, partly from a grid-dip-meter (GD). The fourth series (last reading), indicates the influence of outside disturbance on the activated sample.

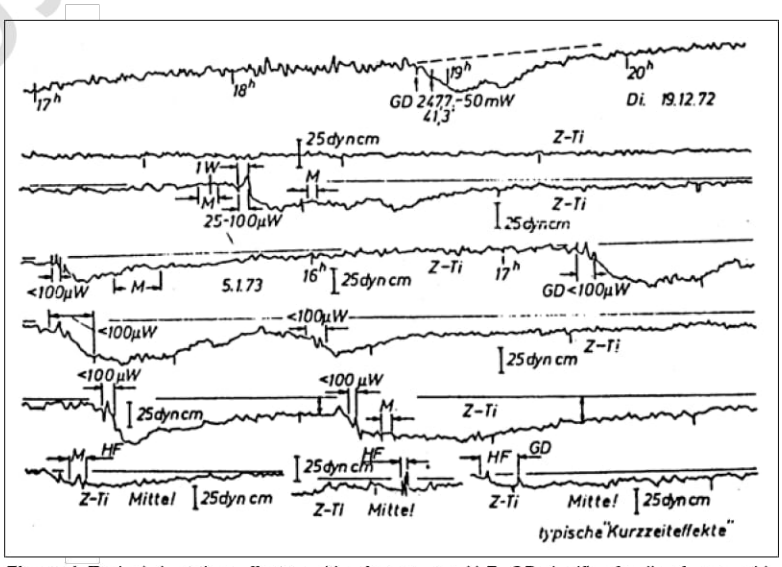


Figure 4. Typical short-time effect resulting from source H-F. GD signifies feeding from a grid-dip-meter; the numbers nearby are frequencies. Also, the maximum value of the source power (mW, µW) is given. "M" signifies additional superposition of a magnetic field - intensity 100 times that of Earth field (Z-Ti is a sample). Also the absolute sensitivity of the TB (dyn-cm/cm) is given. The short vertical line of the curves are time units (distance 1 hr.), with corresponding day units given. In contrast to the other curves, the sample is represented by the last (bottom) series. The resistance to activation is shown in this series in advance of practically no deflection present, which refers to a force effect and not to a torque-moment effect.

New Energy Times Archive

strictly adhered to. These were in the characteristic frequency range of the test apparatus and must be held precisely constant near 10 to 100 Hz. over 1 minute. There are many critical frequencies which are likely discretely distributed and result in activation (Ansprechen) of the sample. The exact adherence to these respective frequencies is absolutely essential. The areas in which are found the critical frequencies are 30 to 40 MHz, 120 to 130 MHz, 200 to 350 MHz. With a sinusoidal supply source, no dynamic effect could be demonstrated. Apparently, partly harmonic (Oberwellenteile) are necessary. Supply of H-F energy with a grid-dip-meter for the determination of resonant frequency resulted in a similar effect.

2. The force effect could not be traced to reciprocal action (Wechselwirkung) with electric or magnetic fields or with outside influences like air movement, heat, structure shocks, etc. It is the case of the framework of a completely novel phenomenon.

3. The force also maintains itself even after the H-F conducting power is turned off, exhibiting on the one hand a short period (approximately two hours), and on the other hand, a long period nature (lasting for days), as shown in Figures 5, 6.

4. The source H-F power was set in the area (maximal) of 100 milliwatts. The duration of the source current was a maximum of up to five minutes. Thus, any such heating effect caused by the H-F source was impossible.

5. Such an "activated" sample reacted dynamically to weak short-time (Kurzzeitige) outside H-F energy effects, such as the switching on of a neon tube, "burning" (Verbraten) of a layered resistor, electric spark discharge at great distances, any H-F oscillations which were not placed in the test room, and also to lightning. With these, a reaction occurred on the TB , resulting essentially in deflections of the TB for a period of one to two hours. This naturally made a completely accurate test performance very difficult, since with the available tools a perfect shielding against outside H-F static disturbances was not possible. The influence of the outside H-F electric discharges could give reason for postulating the deliberate coupling of the ambient H-F energy to the dynamic effect. This outside H-F influence could even be from such weak sources as due merely to the presence of personnel in the test room, which engendered additional effects on the activated sample, exhibiting deflections on the TB of up to two hours. There could be no demonstrated influence from known effects produced by the presence of humans, such as the heating of air due to the entrance of test personnel, air currents, ground sag (Bodendurchbiegungen), etc. It is therefore supposed that from humans and other living creatures emanates and is transmitted a H-F field, in the microwave range which must be made responsible for this influence on the "activated" sample.

6. Furthermore, there appeared longtime effects (Langzeiteffekte) in the activated sample. The balance executed periodic deflections with a duration of about 12 hours, which, moreover, was the superposition of short-time effects, possibly arising from outside H-F source disturbances as indicated in Figures 5,6. The longtime periodic deflection was likely due to the activity of the sun, or from atmos-"spherics" feedback (zuruck fuhrbar). The influence from perceptible sunlight is nevertheless ruled out since the test room was constantly in complete darkness. Consequently, only the microwave part of the sun's spectrum and the atmosphere comes into question. These long-time effects subsided in a time period of about one to two months.

Conclusions with Regards to the Dynamic Effect

Although the described demonstrated forces have not yet attained the order of magnitude of that of the electric power plant level, the availability offered by such hitherto unknown forces, for which a meaningful concurrence with present mechanical-electrical axioms must first be established, gives reason for plenty of cause for further scrutiny. This is also in regards to new, very unconventional propulsion principles. For instance, a sample can release for 120 seconds, a H-F field with a steady energy flux of 1 milliwatt; a force effect of between 5 to 10 dyn. over 2 hr. is observed. This corresponds to an accumulated (gespeicher) impulse of 3.6×10^4 *e.g.* over 7.2×10^4 sec., or energy is fed corresponding to an accumulated impulse of $(7.2 \times 10^4)/(120 \times 10^{-3}) = 6 \times 10^5$ dyn-sec/Ws = 6 Ns/Ws. This value surpasses that of conventional power sources by several powers of ten. This fact provides sufficient grounds to further investigate this phenomenon. Evidently, we must find an answer to the question of exactly how this phenomenon is related to known physical phenomena; can it be traced to an effect of one of these known phenomena? An accurate analysis of all possibilities suggests, however, that there is no known physical effect by virtue of which an explanation of this phenomenon can be summoned. Initial attempts were made to explain this effect through torque which arises from atomic "spin-orbit-coupling" processes (variation of torque-impulses)—for instance by "nuclear-spin-resonance" *e.g.*, dipole-dipole resonance. This

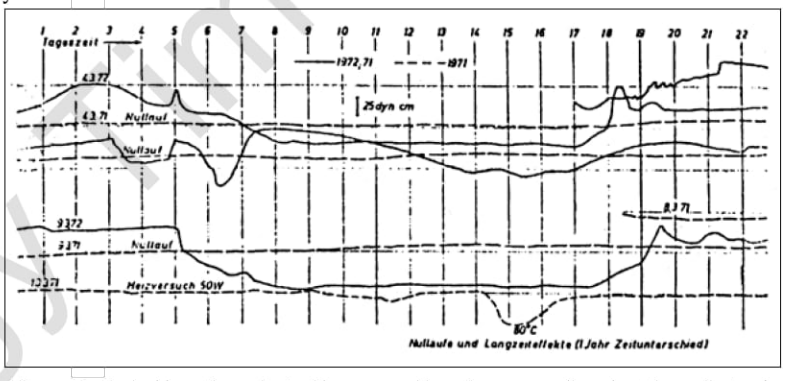


Figure 5. Typical long-time effect with superposition of corresponding short-time effects. In comparison is the null operation of the TB (dotted line curve). In comparison in the lowest series is the influence of a similar disturbance directed to the TB. Here, the water of the sample becomes, under a filament resistance of 50 watts, heated up to a temperature of 80°C. The current through a gold leaf results in 20 m strength.

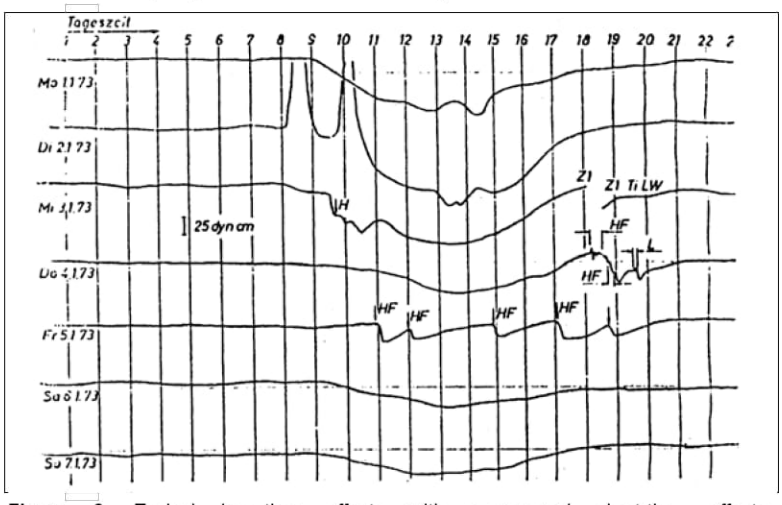


Figure 6. Typical long-time effects with superposed short-time effects. The short-time effects are partly affected by the H-F conducted energy (series 3 and 5 above), and partly by the influence of outer (weak) H-F disturbances (series 2 and 4 above).

New Energy Times Archive

hypothesis could be valid if the H-F was supplied, corresponding closely to the resonant frequency of a spin-orientation appearing in the sample, which becames broken down (abgebaut) with corresponding "relaxation time" and resulting in the variation of the torque-impulse-moment, and hence exerting a dynamic effect on the sample. Thus, in that manner the effect could be associated with nuclear-spin-resonance. However, precise investigations have demonstrated that force, and not torque, is at issue. Namely, the deflection of the TB is dependent on the position of the sample on the balance, which definitely demonstrated the existence of a force effect.

Conclusion with Regards to a New Means for Transmitting Information

Doubtless, it is a matter of a type of electromagnetic effect which causes alterations in physical matter. Over a long period of time these alterations exist in an accumulated form and can be accompanied by a dynamic effect. Concerning the exact nature of this effect, at present we can not yet say. However, it stands at present firmly established that the balance serves as a detector for any process which can disengage the TB with almost ludicrously negligible H-F power. Thus, the possibility of the system registering extraordinarily minute power effects is of the greatest significance. The occurance of dynamic effects through the existence of outside source disturbances, which can be of relatively far distance from the test apparatus, indicated that the sensitivity of this apparatus is susceptible to such H-F outside influences.

Likewise, the firm support for the appearance of the dynamic effect by the presence of test personnel in the room could possibly be explained by postulating that living creatures produce an extremely weak H-F field in the micro-wave range. Moreover, the requisite high constant supply frequency suggests that the resonant process in the sample can terminate (ablaufen) with very negligible half-band-width. Indeed, this is also the case in nuclear-spin-resonance and dipole-dipole resonance in fluids and gases, where half-ban-width of a few Hertz are thus realized. Consequently, it is concluded that due to this very small half-band-width, on the one hand the possibility exists of producing minute H-F power effects, as long as the frequency is sufficed to be held constant. On the other hand, a lower limit for the necessary H-F power is conferred to the system if the supply H-F power frequency interval reaches the order of magnitude of the thermal noise level. By virtue of a half-band-width of a few Hertz, power of 10^{20} watts is conveyed. Although the origin of the dynamic force can not yet be explained, nevertheless these considerations thus indicate why the application of the experimental apparatus can have sensitive response to outside electromagnetic disturbing influences. For instance, the power-flux-density output of a transmitter of 1 watt sending power to a distance of 10^5 km = 10^{21} watt/cm^2, so that a signal source under these conditions can still produce an effect at extraordinarily far distances. The possibility that this could yield a new information transfer process has been previously articulated and needs no further suggestion. When one further considers the propagation of electromagnetic energy under the existing requirements, then another very interesting aspect arises. Normally, through propagation (Ausbreitung) the electromagnetic energy becomes absorbed in matter. This occurs on the one hand through dielectric loss, and on the other hand through reciprocal action of the electrons with the crystal lattice in electrical conductors.

Firstly, we take into consideration the propagation in insulators (small loss mechanism which becomes produced through conducting electrons). In this case the possibility exists that, in the same manner as in Maser, inversion by composition state (Besetzungzustande), which is induced in conjunction with the collapsing (einfallenden) electromagnetic wave, a coherent amplification mechanism is brought about. This could lead to propagation occurring with damping loss (dielectric loss). The inversion of the composition state could constantly make available higher H-F energy (pump frequency). The propagation of electromagnetic waves in the water sample, for instance, could signify that by virtue of absorption of suitable (geeigneter) H-F energy, either from the sun or from storm acitivity, or stemming from any other worldwide source of application of electric energy, a corresponding inversion is brought about in the water energy condition. At this stage, a H-F signal of appropriate frequency is initiated in the water. Consequently, it is possible that through induced emission the propagation of the electromagnetic wave over long distances becomes realized. The intensity of the electric or magnetic field strength could be, nevertheless, extraordinarily small - even below the thermal noise level. It is only necessary that the half-band-width, which is connected with the induced emission resonant process, is correspondingly small, *e.g.* the life span of the inversion condition is correspondingly high. From this could result the possibility of communicating signals and thus information over long distances through water, even water-conducting strata (Schichten). Requirements for an effective information transmission, however, is an appropriate narrow-band receiving system with a bandwidth in the area of a few Hertz. Yet, at the present moment, no accurate statement can be made concerning the necessary frequency for transmission. According to the previous experimental results, this frequency can lie in the ultra-short wave zone, possibly in the microwave region.

Also, the propagation of electromagnetic energy in metallic conductors can be shown to be at odds with the conventional interpretation, when the intensity of the electromagnetic field of the wave is very small. For instance, in the case of an electromagnetic wave with higher intensity than the metal surface of a conductor, the free electrons in the metal become stimulated to resonance with the electric field vector of the wave. This resonance results in large coherent field amplitudes; that is, there exists within large local areas a definite phase relationship between the resonant electrons. It follows that the oscillating electrons generate electromagnetic fields which superpose (hetero-dyne) with the original collapsing electromagnetic wave, and these are attenuated through superposition. This resulting condition is known as the skin effect. However, the attenuation through wave interference is prevented when the definite phase relationship between the oscillating electrons is also altered, which is the case when the electrons deliver collision (Stobe) energy to the lattice. Since this whole irregular impact process develops, the coherence is interrupted. Consequently, the insistence (Eindringteife) of the skin effect is increased, with increasing reciprocal effect from the conducting electrons with the lattice. We now consider the other case, where the electromagnetic field vector amplitude is accordingly negligible. Correspondingly, the energy growth of the conducting electrons is small compared with the thermal electron energy. In this case it is demonstrated that now a different kind of behavior than normal skin effect exists. By the well-known explanation of the skin effect, the energy of the oscillating (resonant) electrons is great compared with the electron thermal energy.

We thus take into consideration that for the second case, the thermal energy of the conducting electrons is possibly greater than for normal skin effect. This deep penetration is due to the

New Energy Times Archive

thermal state (thermalisierung) of the collapsing electromagnetic energy that is yielded to the conducting electrons through scattering (Streuung). The difference of this state compared to that of the customary skin effect is now readily apparent. By the collapsing of an electromagnetic wave of corresponding feeble intensity, the electrons become stimulated to resonance. This electron oscillation state now places a small disturbance of stochastic agitation on the electrons on account of their particular thermal agitation. In this manner, no coherence exists between the oscillating electrons and an attenuation of the collapsing wave through interference can not take place. This is because this portion (Anteile) of the oscillating electrons is seen to exhibit eccentricity (Ausmitteln) temporally and spatially. Thus, it now becomes evident that the propagation of electromagnetic energy under the thermal noise level, over long distances—and also through metallic conductors—is now possible. This important new finding could signify that the electromagnetic energy is not allowed to be completely screened, contrary to present conceptions. The skin effect is naturally a means for possible shielding of electromagnetic energy only up to the noise level (Rauschpegels). However, within the noise level there exists the possibility of an (unimpeded) propagation of electromagnetic energy. It is realized that this aspect for the transmission of signals and information can be of great significance. However, this situation can only be obtained in case extremely narrow bandwidth receivers for electromagnetic energy are known (bekannt) which can respond to extremely weak signals under the noise level.

These findings, the import of which possibly approaches a new realm currently imperceptible (ubersehbare) to human knowledge, grows in its significance when one considers that biological aspects must be taken into consideration. The production as well as the absorption of electromagnetic energy of such minute intensity also possibly corresponds to the frequency spectrum of the molecular structure of living cells, and likely it would seem, is intimately related to the evolution of life itself. Considering that researchers in the USSR have published work in this area, there thus exists the possibility of an information transfer between cells utilizing electromagnetic waves, perhaps in similar fashion as in the experiments under discussion in the present report. These new findings mark the unfolding of a science on the borderland between physics, psychology and biology, which is destined to assume a central role within the next twenty years.

Future Programs

A future program must undoubtedly include a guarantee (Sicherung) for experimental undertakings under application of the most exact rigorous measurements. One of these experimental arrangements should include placing the TB in a high vacuum secured from all air disturbances and which serves as a shield to all outside electromagnetic radiation. In that case, experiments carried out as in the present report could possibly yield the undisputable conclusive confirmation of the described dynamic effect. In addition, the investigations should include a greater frequency range - extended to about 30 Megahertz to 1.4 Gigahertz. In the "Test Findings" section are recorded "long-time" effects, causing a strong influence from the electromagnetic radiation of the sun to possibly appear. Accordingly, the investigated frequency range must be extended to the microwave spectrum of the sun, *e.g.* around 20 Gigahertz. Aside from the measurement of the dynamic effect with the TB, this essentially corresponds to application of H-F spectroscopy with corresponding tools and methods.

The absorption of H-F energy in the sample itself with corresponding investigative methods must be scrutinized further. Furthermore, a receiver for the electromagnetic waves must be at one's disposal which can detect the feeble signals from the thermal noise. Such an apparatus could be developed from utilization of knowledge from the discipline of nuclear-spin-resonance spectroscopy. As is well known, in nuclear-spin-resonance spectroscopy there are employed resonant systems of half-band-width up to 1 Hertz, whereby the thermal disturbances could bring about an increase (Erhohung) in the eccentricity (ausmitteln) of this bandwidth temporally and spatially.

Summary

The dynamic force recorded in the experimental findings is definitely formly established, and can be attributed to no previously known phenomena, which can be of the order of magnitude of 1 to 10 dyn. The observed force manifested itself by H-F coupling and is maintained even with the detachment of the power supply. A constant time of up to 2 hours was ascertained. Although these established force effects have not yet attained the order of magnitude that occurs in standard electrical power plants, there is offered the availability for demonstration of previously unknown forces, for which a meaningful harmony with the axioms of mechanics must be found, which gave sufficient reason for further investigation—also with regard to unconventional propulsion systems.

Emphasis must be placed upon extremely negligible standard supply power (20 microwatt up to a few 100 milliwatt) with which these effects can be brought about. The frequency of the source H-F energy must be held precisely constant if the effect is to be produced. Thus, it is a question of the characteristic quality (peculiarity) of the sample. Furthermore, it is indicated that a periodic signal can be established, which is drowned (untergehen) in thermal noise. It was indicated that the propagation of such feeble H-F signals is prolonged not only in insulators but conductors, as compared to hitherto diverse (Geubten) approaches. That is why, through induced emission, an amplification mechanism exists by which a propagation of feeble electromagnetic signals over long distances is possible. With regard to the propagation of weak electromagnetic signals in conductors it became established that, likewise, in contrast to known diverse approaches, the superimposed (heterodyned) auxiliary energy is small compared to the thermal energy of the electrons.

Although the present experimental findings can not yet be completely assured of value, there nevertheless exists remarkable consequences arising from these findings. Doubtless, it is a matter of a phenomenon, which through "conduction" by electromagnetic energy, gives rise to alterations in material substances. This energy can be available in potent form over a long period of time resulting in a dynamic effect, whereby gravitational reciprocal action is not to be ruled out (auszuschlieben). ■

Cold Fusion & New Energy Lectures

by Dr. Eugene F. Mallove
Editor-in-Chief
Infinite Energy Magazine
and author of *Fire From Ice*,
Generate lots of excess heat
(and new-thinking!) in your
scientific, engineering, business,
civic, or religious organization.

Call: 603-228-4516; Fax: 603-224-5975

New Energy Times Archive

TRANSLATOR'S ANALYSIS AND COMMENTS ON THE ZINSSER-EFFECT DEVICE

Donald Reed
44 Paul Place Buffalo, NY 14210

Introduction

During the 1970's, when this experimental apparatus underwent its first testing in an official capacity, the explanation of the accompanying effect in terms of known natural forces was not possible. At that time, the physics community accordingly dismissed its significance, attributing the anomalies either to a fluke or experimental error. Thus, they failed to recognize its veritable import, not only for the purpose of tapping a source of potentially inexhaustible energy, but as providing a possible groundwork for forging a new paradigm of physics and metaphysics. However, since that time many other effects of a similar nature have been reported through the utilization of various diverse electromagnetic apparatus. Through this research the field source of these effects, as well as its mode of interaction with known physical forces, has been more clearly delineated. Thus, in the interim it has been determined that the Zinsser effect, among others, can be attributed to the interaction of "activated" mass with the all-pervasive energetic vacuum medium. Although the role of the vacuum as viewed by contemporary physics up to this point has been limited to microscopic quantum interactions (*i.e.*, via quantum electrodynamics, quantum chromodynamics, Casimir effect, etc.),[1] in this report we wish to consider a principally classical model for this interaction. Thus, we will attempt to show that by attributing the Zinsser effect to a type of vacuum polarization understood from a macroscopic classical context, this research deserves a second look through replication of the prime mover.

In this light, the specific operation of the vacuum in rendering such force effects can perhaps be best ascertained via a scrutiny of the recent Russian findings on so-called torsion fields.[2] These have been modeled in essence as a product of the characteristics of classical long-range spin effects, which in turn cause specific modes of vacuum polarization to occur. A classical analysis of the phenomenon is also in keeping with Zinsser's original account of the functioning of the apparatus, which appeals to a macroscopic classical treatment as well. This analysis was recently included in the documentation of the discovery of the so-called kinetobaric force published by Integrity Research Institute,[3] to which we will make continual reference. Moreover, studying the phenomena engendered by this early 1970's experiment can, in turn, hopefully provide a better understanding of the process of anomalous energy generation from more recent related experimental research.

With the following account, which explores findings from the Zinsser research and other related work, perhaps more of the missing pieces of the still mysterious puzzle surrounding the role of the vacuum in nature can be put into place. Also, hopefully any confusing data or information rendered from weaknesses in the translation of the original German document might be made clearer. Above all, through the effort taken here to recount these events, perhaps mainstream physics will come to the realization of the authenticity of these effects and that it is time to sit up and take notice, squarely facing the potential ramifications of energy generation out of the vacuum, from the standpoints of both future energy science and for shaping the emerging paradigm for the imminent millennium. Clearly, the coming new outlook on nature's operations is destined to make the prevailing one seem archaic in comparison.

Embodiment of the Zinsser Power-Generating Prime Mover

The original conception for the power-generating unit in the Zinsser device derived from a unique type of pulse generator described in his U.S. Patent #4,085,384 (abstract on page 59). As can be seen from Figure 1, this generator is comprised of a standard push-pull oscillator which includes a resonant circuit having multiple resonances. This circuit is tuned to the fundamental frequency, corresponding to the pulse repetition rate, and at least the first and second harmonics in such a way that on the output side a sawtooth wave is generated whose steep leading edge has a pulse width corresponding to the third (or highest) harmonic. The fundamental frequency mainly determines the pulse power of the generator, whereas the harmonics chiefly have an influence on the shape of the pulse, specifically the steepness of the leading edge. Thus, for optimum operation the amplitude of the highest harmonic is substantially smaller than that of the fundamental frequency (about 1/6).

This system must then be modified to accommodate the specific embodiment of Zinsser's prime mover. Here, instead of a load, the output is connected to two electrodes consisting of zig-zag circuits which are submerged in water whose dielectric constant is 80. These twin electrodes are aluminum tapes 15 mm wide, 70 mm long (1/4 wavelength), and are separated by 10 mm distance.

Brief Compilation of Field Effects

Upon application of high frequency electromagnetic energy (microwave) to the device, persistent deflection of the torsion balance was observed for much longer periods than the original "trigger" energy, after the initial excitation was turned off. Residual anomalous forces of up to 10 dynes were observed to be activated within the sample and deflect the balance. The longest of the effects lasted for a period of several weeks. The period of oscillation of the

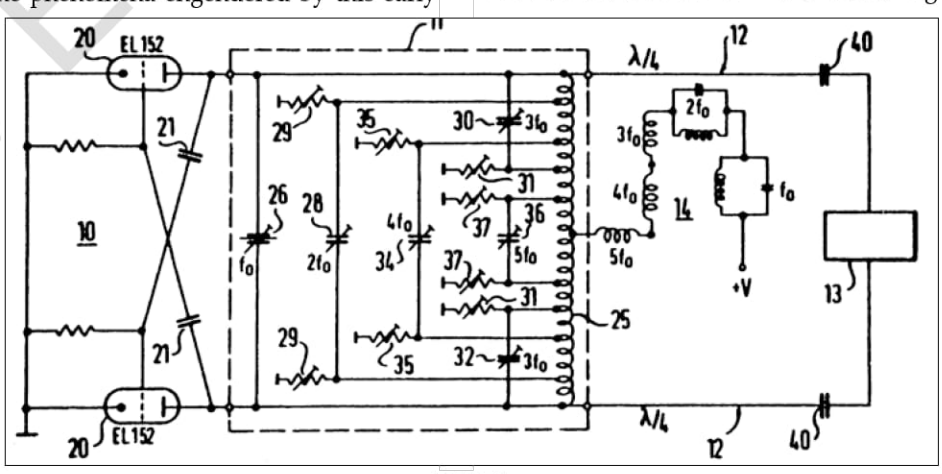


Figure 1.

New Energy Times Archive

balance was noticeably affected by outside weak electrical effects from sine wave sources (lightning flashes, switching on electrical apparatus, etc.) which, by standard electrical theory, would be deemed too weak to influence the system. It is to be noted that sine wave forms of electromagnetic energy only influenced the device after it had been first activated by the sawtooth EM pulse. In addition, long-term effects exerting a measurable influence on the system were noted from astrophysical sources such as the sun, moon, stars, etc. Also, personnel that had been present in the test room at the time of activation of the system caused measurable deflections of the balance after they had left the room and re-entered, whereas those individuals originally outside the room at activation time caused no such effects upon coming in to the test room later. Moreover, ambient inanimate objects within the test room at the time of primary activation having the same mass as test personnel did not cause any deflections to occur when they were brought back into the test room.

Proposed Explanation for Field Effects

As has been indicated, two decades ago when these type of effects were first recorded, little information was available on the role of the vacuum in promoting manifestations of various energy phenomena in a classical context, such as the anomalous inertial impulses produced with the Zinsser apparatus. Moreover, the prevailing physics paradigms at that time did not allow for the vacuum to play an active role, especially in a macroscopic context. Also, the law of conservation of momentum presupposes that that there must be a common definable center of mass between the two reaction partners of the dynamic process. However, with the Zinsser kinetobaric effect, a second ponderable body mass is not a factor. Moreover, the laws of conventional dynamics operate in a closed physical system in which the center of mass law can and must be applied, whereas the kinetobaric impulse gain occurs in an open system. Because of these unique counterintuitive features of the kinetobaric sytem, Zinsser originally conceived the effect as the result of creation of an anisotropy in the gravitational field, caused by a specific electromagnetic "trigger" energy.[3]

According to the insight which has been provided in the interim on the key role of the vacuum in physical processes, we wish to make certain observations and specific important adjustments to Zinsser's interpretation. For this purpose, we adopt the Dirac model of particle-antiparticle pairs as representative of primordial vacuum structure. Here, however, in non-polarized vacuum the pairs are mutually interpenetrating annular wave-packets. Moreover, pursuant to the vacuum model advanced by Russian research on torsion fields, we shall postulate that classical spin motion, either from macroscopic bodies or sub-atomic particles can perturb the quiescent state and create a specific type of vacuum polarization.[4] Modern physics of the electron dictates that only the quantum-mechanical spin concept governed by the Dirac equation can effectively account for energy effects from the vacuum via quantum electrodynamic formalism. However, unlike the mechanism attributed to quantum spin effects, the torsion fields involve the use of long-range classical spinors to describe such interactions. Here, focus is not on the Dirac equation to describe fermion spin, but on a classical analogue, the Bargmann-Michel-Telegdi (BMT) equation to account for spin effects.[5] BMT follows from a quasi-classical extension of the Dirac equation and accounts for vacuum energy effects usually attributed to quantum electrodynamic treatment, such as the anomalous magnetic moment of the electron and radiative self-polarization.

Thus, classical angular momentum or spin has been shown to be the source of the torsion field in the same manner as electric charge and mass produce electromagnetic and gravitational fields, respectively. In regards to the current report, we will attempt to show that Zinsser's kinetobaric effect, as well as other key yet unexplained electromagnetic effects, are a result of coupling of EM fields to torsion fields.

One of the most fascinating and mysterious features of torsion fields, apparently well validated by Russian experimentation, is the ability under torsion action for the physical vacuum to be preserved in a prolonged polarized metastable state long after the removal of the original excitation.[6,8] This unique ability, which is one of the key signatures of torsion fields, to apparently structurize space was also a feature of the kinetobaric effect in which anomalous inertial impulses deflected the torsion balance for days and weeks after the original EM excitation was turned off.[7] Also, Chernetsky's plasma experiments which produced the so-named self-generating discharge (SOD) featured similar effects.[8] In one experiment, a resistor placed between the plates of a capacitor showed a decrease by 6-8% when the generator was turned on.[8] However, when the generator was turned off, the pointer maintained its position, showing that the resistor continued to maintain reduced resistance.[8] Curiously, when the resistor was removed from between the capacitor plates, the resistance returned to normal. Residual effects as a result of torsion field action were also recorded at PERM University, where measurements of the electromotive force of various galvanic cells and hydrogen permeability of metal membranes during electrolytic evolution of hydrogen were carried out.[9] With a torsion generator on, not only was there a shift of electrolytic potential to more negative values and a slow increase in hydrogen flow, but when the torsion excitation was removed hydrogen flow increased further for an additional half hour.[9] It goes without saying that this key finding might have importance for the future development of technology for the facilitation of nuclear reactions with the aid of low-energy electrolytic action.[10]

A related effect of torsion field action is the permanent restructurization of the atomic-molecular matrix of various metals, before they have crystallized from a melt into a solid.[4] A similar phenomenon was evidenced with the catastrophically fractured metal samples which were exposed to radiation from Hutchison's electromagnetic field effect.[11] Also, in the latter as well as in Zinsser's work, anomalous inertial impulses were recorded. In Hutchison's research, the complete lift/levitation of different substances of varying mass was observed.[11] In contrast to the Zinsser and Chernetsky experiments, there were no reported residual vacuum polarization effects after turn-off of the Hutchison apparatus.

Biological human informational fields also possess a unique active component of torsion energy, which is not present in inanimate matter. This has been demonstrated in both the Zinsser and Chernetsky research. Accordingly, a feature of the kinetobaric effect was the deflection of the torsion balance by re-entry into the test room of personnel who were present at the time of original excitation.[7] With the Chernetsky SGD, the human biofield was able to decrease the stability of a quartz generator by three orders of magnitude.[8] Moreover, additional anecdotal evidence suggested that both the clairvoyant and telekinetic abilities of humans were increased when they were subjected to the SGD.[8] Zinsser has offered the following explanation for the biofield effect, which bears a remarkable resemblance to the residual "vacuum-storage" ability of torsion fields. He claims that with primary activation, a certain "baric"

New Energy Times Archive

pattern may have been impressed on the vacuum, stored partly by the activated matter and partly by the experimenter's mass. Upon re-entry into the test room, the similarity of both patterns is possibly "recognized" and thus triggers the effect.[3]

Conclusions and Prospects

The continual appearance of research results, such as the kinetobaric effect, which cannot be explicated in terms of conventional scientific paradigms, certainly offers clear evidence of the incompleteness of our knowledge of nature even in this enlightened era in the waning years of the twentieth century. Accordingly, hints as to how the kinetobaric effect arises and interacts with known physical forces can perhaps assist us towards the development of a more comprehensive paradigm which embraces a wider spectrum of human knowledge. For instance, the fact that the rise time of the EM pulse that is applied to the Zinsser device is very fast may have key importance in this regard.[3] The Russians, for example, have claimed success in accelerating the treatment of various diseases through application of millimeter electromagnetic radiation pulses with very fast rise time.[12] In general, it may be the case that high-voltage nonlinear EM "impulses" with very fast rise time and very short duration might tend to induce vacuum coherence and information propagation via torsion wave coupling.

Secondly, such empirical evidence which generally flies in the face of current scientific wisdom also presents the greatest challenge to our ongoing search for new sustainable energy sources which will be of absolute necessity in the coming millennium. In this regard, the exposition in the original German document on a possible revolutionary new means of communication where, via the kinetobaric effect, weak outside EM excitations are boosted and carried great distances apparently with little attenuation, deserves closer scrutiny.[7] Also, similar propagation characteristics have been reported through Russian experimentation showing actual communication via torsion fields where speed of transmission has been claimed to greatly exceed the velocity of light.[4] Kozyrev's work on the true positions of stars in the stellar realm also implies a superluminal transmission of torsion radiation.[13,14]

Thirdly, focus on the cause of the kinetobaric effect in connection with the various findings on torsion fields can perhaps assist us towards development of a more comprehensive paradigm—one in which the current conundrums rampant in the foundations of theoretical physics (especially electromagnetic theory) prevent the establishment of a unified macroscopic model of all physical interactions. On the basis of currently inexplicable electromagnetic anomalies, such as the kinetobaric effect, in a forthcoming paper the author will advance a theoretical model for EM-torsion field coupling that might suggest future experimental protocols for tapping the energy of the vacuum. As an offshoot of this exposition, possibly a new more expansive understanding of the role of the vacuum in nature will be in the offing.

References

1. I.J.R. Aitchison, "Nothing's Plenty: The Vacuum in Modern Field Theory,"*Contemp. Phys.*, Vol. 26, No. 4, p. 333, 1985.

2. H. Fox, "Torsion Fields - A New Science," *New Energy News*, Vol. 4, No. 11, p. 12, Mar. 1977.

3. T. Valone (ed), *Mechanical Energy from Gravitational Anisotropy*, Integrity Research Institute, Washington, DC, 1996.

4. V. Bagrov *et al.*, "Possible Manifestations of the Torsion Field," *Sov. Phys. Jour.*, p. 208, March 1992; A. Akimov, G. Shipov, "Torsion Fields and Their Experimental Manifestations," *Proc. in. Conf. on New Ideas in Natural Science St. Petersburg*, p. 221, June 1996.

5. V. Bagrov, V. Bordovitsyn, "Classical Spin Theory," *Sov. Phys. Jour.*, p. 128, Feb. 1980.

6. A. Akimov, V. Tarasenko, "Models of Polarized States of the Physical Vacuum and Torsion Fields," *Sov. Phys. Jour.*, p. 214, March 1992.

7. W. Peschka, "Kinetobaric Effect as Possible Basis for a New Propulsion Principle," Raumfahrtforschung, Feb. 1974; trans. by D. Reed In: *Mechanical Energy from Gravitational Anisotropy*, Integrity Research Institute, Washington, D.C. 1996.

8. A. V. Chernetsky, "Processes in Plasma Systems with Electric Charge Division," *Deutsche Vereinigunq fur Schwerkraft-Feld Energie* e.V., No. 25, March 1991, No. 27, Feb. 1992.

9. V. Panov *et al.*, "Torsion Fields and Experiments," *Jour. New Energy*, Vol. 2, No. 3-4, p. 29, Winter 1997.

10. M. King, *Tapping the Zero-Point Energy*, Paraclete Pub., 1989.

11. J. Hutchison, "The Hutchison Effect Apparatus," *Proc. of the 1st Int. Symp. on New Energy*, Denver, p. 191, May 1994.

12. A. Michrowski, J. Manning, R. Beck, "The MRT, Microwave Resonance Therapy: USSR Clinical Results," *Deutsche Vereinigung fur Schwerkraft-Feld Energie* e.V., No. 27, p. 84, Feb. 1992.

13. N. Kozyrev, "Possibility of the Experimental Study of the Properties of Time," JPRS Pub., No. 45238, 2 May 1968; N. Kozyrev, "An Unexplored World," *Soviet Life*, p. 27, Sept 1965.

14. M. Lavrent'ev *et al.*, "Remote Effect of Stars on a Resistor," *Sov. Phys. Dokl.*, Vol. 35, No. 9, p. 818, Sept 1990; ...,"Detection of the True Position of the Sun," *Sov. Phys. Dokl.*, Vol. 35, No. 11, p. 957, Nov. 1990; ,"Detection of the Reaction of Matter to an External Irreversible Process," *Sov. Phys. Dokl.*, Vol. 36, No. 3, p. 243, March 1991; "Scanning the Celestial Sphere with a Kozyrev Detector," *Sov. Phys. Dokl.*, Vol. 37, No. 4, p. 163, April 1992.

15. V. I. Kichigin *et al.*, "Torsion Fields and Electrochemical Processes at Metal Electrolyte Interface," *Jour. of New Energy*, Vol. 1, No. 2, p. 27, 1996.

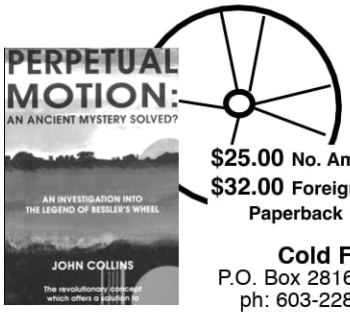
Patent No. U.S.4,085,384: Circuit for producing pulses by differentiating output of sawtooth oscillator.

Inventor(s): Zinsser, Rudolf G., Idar-Oberstein, Federal Republic of Germany

Applicant(s): Reuter Technologie GmbH, Am Rauhen Berge, Federal Republic of Germany
Publication Date: April 18, 1978
Application Date: April 21, 1997
Application Number: US1977000789579
IPC Class (Ed. 2): H03K 006/06; H03B 005/10; H03K 005/01
U.S. Class: 331/074; 328/028; 328/034; 328/059; 331/168
Field of Search: 331-74-77, 117 R, 167-171; 328-59, 60, 28, 66-68, 34, 36; 307-261

Abstract: The generator produces a pulse train with a given pulse duty factor and a relatively small pulse width and compromises an oscillator including a resonance circuit having multiple frequencies and tuned to the fundamental frequency corresponding to the pulse repetition rate and to at least the first and second harmonics of the fundamental frequency. On the output side, there is generated a sawtooth wave with a steep leading edge having an inflexion point. Differentiation members couple the resonance circuit to a load so that, as a result of matched differentiation of the steep leading edge of each sawtooth of the wave, a pulse, having a pulse width corresponding approximately to the pulse time of the leading edge, acts on the load.

PERPETUAL MOTION: An Ancient Mystery Solved?



$25.00 No. Amer.
$32.00 Foreign
Paperback

"The book deserves to be on many a history of science shelf, not only for the mechanical puzzle it poses but also for the timeless human story it tells... "
Dr. Thomas Phipps, Jr.

Cold Fusion Technology
P.O. Box 2816, Concord, NH 03302-2816
ph: 603-228-4516; fax: 603-224-5975

New Energy Times Archive

FORCE AND GRAVITY

Frank Znidarsic
481 Boyer Street, Johnstown, PA 15906
http://members.aol.com/fznidarsic/index.html

The study of the form, function, and composition of matter has been, and continues to be, one of the greatest intellectual challenges of all time. In ancient times the Greek Empedocles (495-435 B.C.) came up with the idea that matter is composed of earth, air, fire, and water. In 430 B.C. the idea of Empedocles was rejected by the Greek Democritus of Abdera. Democritus believed that the substances of the creation are composed of atoms. These atoms are the smallest bits into which a substance can be divided. Any additional subdivision would change the essence of the substance. He called these bits of substance "atomos" from the Greek word meaning "indivisible." Democritus was correct in his supposition; however, at the time, no evidence was available to confirm this idea. Ancient technology was primitive and could not confirm or contest any of these ideas. Various speculations of this sort continued to be offered and rejected over the next 2,000 years. The scientific revolution began in the seventeenth century. With this revolution came the tools to test the theories of matter. By the eighteenth century these tools included methods of producing gases through the use of chemical reactions, and the means to weigh the resultant gases. From his studies of the gaseous by-products of chemical reactions, French chemist Antoine Lavoisier (1743-1794) discovered that the weight of the products of a chemical reaction equals the weight of the original compound.

The principle of "the conservation of mass" was born. For his achievements, Lavoisier is known today as the father of modern chemistry. Late in the eighteenth century, another new tool, electrical technology, began to be applied to test the theories of matter. The first electrical technology to be applied to the study of matter and electrolysis, involved the passing of an electrical current through a conductive solution. If an electrical current is passed through a conductive solution, the solution tends to decompose into its elements. For example, if an electric current is passed through water, the water decomposes, producing the element hydrogen at the negative electrode and the element oxygen at the positive electrode. With the knowledge obtained from the use of these new technologies, English schoolteacher John Dalton (1766-1844) was able to lay down the principles of modern chemistry. Dalton's theory was based on the concept that matter is made of atoms, all atoms of the same element are identical, and atoms combine in whole number ratios to form compounds. Electrical technology became increasingly more sophisticated during the nineteenth century. Inventions such as the cathode ray tube (a television picture tube is a cathode ray tube) allowed atoms to be broken apart and studied. The first subatomic particle to be discovered was the electron. In 1897, J.J. Thomson demonstrated that the beams seen in cathode ray tubes were composed of electrons. In 1909, Robert Millikan measured the charge of the electron in his now famous oil drop experiment.

Two years later, Ernest Rutherford ascertained the properties of the atomic nucleus by observing the angle at which alpha particles bounce off of the nucleus. Niels Bohr combined these ideas and, in 1913, placed the newly-discovered electron in discrete planetary orbits around the newly-discovered nucleus. The planetary model of the atom was born. With the appearance of the Bohr model of the atom, the concept of the quantum nature of the atom was established.

The Quantum Mystery

As the temperature of matter is increased, it emits correspondingly shorter wavelengths of electromagnetic energy. For example, if a metal poker is heated it will become warm and emit long wavelength infrared heat energy. If the heating is continued, the poker will eventually become red hot. The red color is due to the emission of shorter wavelength red light. If heated hotter still, the poker will become white hot emitting even shorter wavelengths of light. An astute observer will notice that there is an inverse relationship between the temperature of the emitter and the wavelength of the emission. This relationship extends across the entire electromagnetic spectrum. If the poker could be heated hot enough it would emit ultraviolet light or X-rays. In 1900, the German physicist Max Karl Ludwig Planck studied the light emitted from matter and announced that light waves were given off in discrete particle-like packets of energy called quanta.

Today Planck's quanta are now known as photons. The energy in each photon of light varies inversely with the wavelength of the emitted light. Ultraviolet, for example, has a shorter wavelength than red light and, correspondingly, more energy per photon than red light. The poker in our example, while only red hot, cannot emit ultraviolet light because its atoms do not possess enough energy to produce ultraviolet light. The Sun, however, is hot enough to produce ultraviolet photons. The ultraviolet photons emitted by the Sun contain enough energy to break chemical bonds and can "Sun" burn the skin. The radiation spectrum cannot be explained by any wave theory. This spectrum can, however, be accounted for by the emission of a particle of light or photon. In 1803, Thomas Young discovered interference patterns in light. Interference patterns cannot be explained by any particle theory. These patterns can, however, be accounted for by the interaction of waves. How can light be both a particle and a wave?

In 1924, Prince Louis de Broglie proposed that matter possesses wave-like properties.[1] According to de Broglie's hypothesis, all moving matter should have an associated wavelength. De Broglie's hypothesis was confirmed by an experiment conducted at Bell Labs by Clinton J. Davisson and Lester H. Germer. In this experiment an electron beam was bounced off of a diffraction grating. The reflected beam produced a wave-like interference pattern on a phosphor screen. The mystery deepened; not only does light possess particle-like properties but matter possesses wave-like properties. How can matter be both a particle and a wave?

The Great Mistake

Waves tend to propagate. Throw a stone in a lake and watch the waves propagate away from the point of impact. Listen to a distant sound that has traveled to you from its source. Shake a rope and watch the waves travel down the rope. Tune in a distant radio station, the radio waves have traveled outward from the station to you. Watch the waves in the ocean as they

New Energy Times Archive

travel into the shore. In short, waves propagate; it's their nature to do so, and that is what they invariably do. Maxwell's equations unequivocally demonstrate the fact that waves will propagate. Matter waves, however, remain "stuck" in the matter. Why do they not propagate? What "sticks" them? An answer to this question was presented at the Copenhagen convention. The Copenhagen interpretation states that elementary particles are composed of particle-like bundles of waves. These bundles are known as wave packets. These wave packets are localized (held in place) by the addition of an infinite number of component waves. Each of these component waves has a different wavelength or wave number. An infinite number of waves, each with a different wave number, is required to hold a wave packet fixed in space. This argument has a major flaw. Can an infinite number of real waves exist within a finite universe? The Copenhagen interpretation attempts to side step this problem by stating that the wave packets of matter are only mathematical functions of probability. These probability functions contain no energy. Without energy or physical form no real existence is possible. Only real waves can exist in the real world, therefore an imaginary place of residence, called configuration space, was created for the probability waves.

Ordinary rules, including the rules of wave propagation, do not apply in configuration space. The propagation mystery was supposedly solved. This solution sounds like and has much in common with those of the ancient philosophers. It is dead wrong! Einstein also believed that something was amiss with the Copenhagen interpretation. His remark, "God does not play dice," indicates that he placed little confidence in these waves of probability. Einstein did not have the answer to the mystery. For the most part, the error made little difference, modern science advanced, and bigger things were discovered. It did, however, make at least one difference; it forestalled the development of gravitational and low level nuclear technologies for an entire century.

The Correction

Matter is composed of fields, forces, and energy, not mathematical functions. Matter can be mathematically modeled but a mathematical model does not make matter. Matter waves are real, they contain energy, are the essence of mass, and convey momentum. They do not propagate because they are held in place by forces. A symmetry exists between force and gravity. Just as a changing magnetic field induces an electric field, a changing momentum (a force) induces a gravitational field. The forces that contain the waves of energy within matter generate the gravitational field of matter.

Gravitional Mass

Consider that energy is trapped in a massless perfectly reflecting box (see Figure 1). The energy in the box is a simplistic representation of matter. The energy in this model represents the matter wave function and the box represents the potential well of matter. As the energy bounces off of the walls of the box momentum, "p" is transferred to the walls of the box. This momentum is given by:[2]

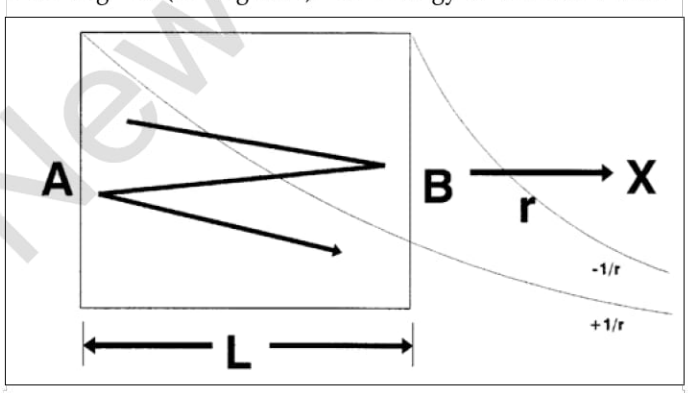


Figure 1. Energy in a potential well.

$$p = 2E / c \qquad (1)$$

where E is the energy
c is light speed
p is the momentum (total radiation pressure)

Each time the energy strikes a wall of the box it produces a force. This force generates the gravitational mass associated with the energy in the box. The relationship between the induced gravitational field and force, as demonstrated by the General Theory of Relativity[3] is given by:

$$\mathbf{G} = G(dp/dt)/(c^2 r) \qquad (2)$$

where **G** is the gravitational field in newtons / kg
G is the gravitational constant
r is the gravitational radius
dp/dt is force

Each time the energy strikes a wall of the box it produces a gravitational field according to Equation 2.

The gravitational field produced by an impact varies with the reciprocal of distance $1/r$. The gravitational field produced by matter varies as the reciprocal of distance squared $1/r^2$. This author has ascertained how the $1/r^2$ gravitational field is produced by a force. It will now be shown that the superposition of a positive field that varies with an $1/r$ rate with a negative field that varies with a $1/r$ rate produces the $1/r^2$ gravitational field of matter. An exact mathematical analysis of the gravitational field produced by the photon in the box will now be undertaken.

Refer to Figure 1.

L = The dimensions of the box
p = momentum
t = the time required for the photon to traverse the box = L/c
r = the distance to point X

The far gravitational field at point X is the vector sum of the fields produced by the impacts on walls A and B. This field is given by Equation 3.

$$\begin{aligned} \mathbf{G}_{(\text{at X})} &= 1/r \text{ field from wall A} - 1/r \text{ field from wall B} \\ &= G\,(dp/dt) / [c^2 (r+L)] - G\,(dp/dt)/[c^2 r] \\ &= -\,(G/c^2)\,(dp/dt)\,(L/(r^2 + r\,L)) \end{aligned} \qquad (3)$$

Taking the limit one obtains the far field. Far, in this example, means greater than the wavelength of an electron.

$$\lim -(G/c^2)\,(dp/dt)\,(L/(r^2 + r\,L)) = -(G/c^2)\,(dp/dt)\,(L/r^2) \qquad (4)$$
as r>>L

Substituting the actual momentum produced by the energy in the box for dp/dt yields:

$$dp/dt = 2\,\Delta p / \Delta t = (2E/c) / (L/c) = 2E/L \qquad (5)$$

Equation 5 was substituted into Equation 4 and a factor of 1/2 was added. The factor of 1/2 is required because the resultant field is produced by two impacts and the energy can only impact one wall at a time.

$$\mathbf{G}_{(\text{at X})} = -(1/2)\,(G/c^2)\,(2E/L)\,(L/r^2)$$

Substituting mass for energy, $M = E / c^2$

$$\mathbf{G} = -GM / r^2 \qquad (6)$$

New Energy Times Archive

The result, Equation 6, is Newton's formula for the gravitational field.[5] This analysis clearly shows that forces within matter generate the gravitational field of matter.[6]

New Technologies

The movement of ordinary matter does not produce a net magnetic field. The movement of charged matter does produce a net magnetic field. Charged matter is produced by the separation of positive and negative charges. The derivation used to develop Newton's formula for the gravitational field (Equation 3) shows that matter may harbor near field positive and negative gravitational components. Normally these near field components have a range of only a few nanometers. Superconductive wavefuctions extend for the length of the superconductor. In a superconductor the range of the gravitational near field components may extend for meters. The rotation of these local fields may be responsible for the gravitational anomaly observed by E. Podkletnov at Tampere University in Finland.[7]

Conventional wisdom has it that the phenomena of superconductivity effects only the electromagnetic field. It has just been shown that superconductivity also effects the gravitational field. This author believes that the altered permeability within a superconductor increases the range of the nuclear spin orbit force beyond the nucleus. This effect produces the low level nuclear reactions seen in condensed systems.[8]

Conclusion

It has been shown that gravitational mass is generated through the application of a force. A radical new model of matter has been developed. This model shows that unbalanced forces localize the zero point energy of matter. These forces also generate the gravitational mass of matter. The model is so simple that once it is seen it appears to be almost self evident. This model leads to the new technologies of levitation and energy production.

Notes

1. French aristocrat Louis de Broglie described the electrons wavelength in his Ph. D. thesis in 1924. De Broglie's hypothesis was verified by C. J. Davisson and L. H. Germer at Bell Labs.

2. Gilbert N. Lewis demonstrated the relationship between external radiation pressure and momentum. Gilbert N. Lewis. *Philosophical Magazine*, Nov. 1908.

3. A. Einstein, *Ann d. Physics* 49, 1916.

4. Einstein's principle of equivalence was experimentally confirmed by R.v. Eötvös in the 1920's. R.v. Eötvös, D. Pekar, and Feteke, *Ann. d. Phys* 1922. Roll, Krotkov and Dicke followed up on the Eötvös experiment and confirmed the principle of equivalence to and accuracy of one part in 10^{11} in the 1960's. R.G. Roll, R. Krokow & Dicke, *Ann. of Physics* 26, 1964.

5. Sir. Issac Newton, *PHYILOSOPHICA NATURALIS PRINCIPIA MATHEMATICA* (1687).

6. *Extraordinary Science*, Vol. 3, Issue #1 (Jan/Feb/Mar 1991): "...it is postulated that the Moebius field or a similar three-dimensional standing wave field with two orthogonal degrees of freedom, may play a fundamental role in the actual dynamic structure of elementary particles at the sub-atomic level. The recent research on electrons in England headed by physicist R.C. Jennison appears to offer firm support for elements of such a model. The conclusion reached by this team, confirmed by experimentation, is that contrary to the currently excepted Copenhagen interpretation, quantum aspects of nature may not be fundamental, but can arise out of a completely classical model for elementary particles. This model entails a purely geometrical structure formed exclusively by the standing wave characteristics of time-varying electric fields. In particular, the electron can be considered as a finite cavity of radiation formed out of two orthogonal electromagnetic standing waves in phase-locked quadrature."

The article refers to Jennison, R.C., "What is an Electron?" *Wireless World*, June 1979, p. 43.

Jennison became drawn to this model after having experimentally demonstrated the previously unestablished fact that a trapped electromagnetic standing wave has rest mass and inertia.

7. "A Possibility of Gravitational Force Shielding by Bulk $YBa_2Cu_3O_{7-x}$", E. Podkletnov and R. Nieminen, *Physica C*, Vol 203 (1992), pp 441-444.

8. Patent #4043809 : High temperature superconductors and method issued: Aug. 23, 1977.

This invention comprises a superconductive compound having the formula: $Ni_{1-x}\ M_x\ Z_y$ wherein M is a metal which will destroy the magnetic character of nickel (preferably copper, silver or gold); Z is hydrogen or deuterium; x is 0.1 to 0.9; and y, correspondingly, 0.9 to 0.1, and method of conducting electric current with no resistance at relatively high temperature of T>1° K comprising a conductor consisting essentially of the superconducting compound noted above.

Wachsman continued from page 25

tant point, however, is that there are science mysteries that lie right under our noses if only we would open our eyes and minds to them. Regretably, there are scientists who need to stop trying to tell everyone else what to think about the unexplained until they themselves first learn how to think about these scientific mysteries. If attitudes do not change, science will indeed continue to remain "like a candle in the dark."

About the Author

Richard Henry Wachsman holds BSEE and MSEE degrees from MIT and has completed several years of doctoral studies in physics. From 1964 to 1971, he was a communication systems engineer, serving as a consultant to NASA and DOT for ADCOM, a Cambridge, MA think tank. After a brief stint at MITRE Corporation in Bedford, MA, he began a career in sales and marketing, and then Residential Conservation Services. He has been conducting independent research into the physics of the unexplained and the unexplained of physics while pursuing careers in sales and then residential energy auditing. In 1989 he made his first major discovery involving the effects of magnetically coupled rotating water molecules. A second major discovery, on the relationship between quantum mechanics and the nature of the quantum vacuum, was made in 1995. Mr. Wachsman plans to write several books detailing his findings and he hopes to start a think tank networking organization to help other independent researchers generate funding and support for their research.

Limited Edition CD!
Antigravity Cold Fusion Ball Lightning
Runs on any computer with a browser

- Theory
- Stories, reports
- Pictures taken at LANL, NASA, Puthoff's Institute, Wright Patterson, and ENECO
- Movies of Stenger's ball lightning experiments, lobby at PowerGen, lectures, Cutlass Submarine, plasma ball in a microwave chamber, cryogenic zero point energy experiments/index

$19.95 No. America
$ 23.95 Foreign
Order from:
Cold Fusion Technology, Inc.
P.O. Box 2816,
Concord, NH 03302-2816
Phone: 603-228-4516
Fax: 603-228-5975
E-mail: staff@infinite-energy.com

New Energy Times Archive

Cold Fusion Comix

— A variety of humorous insights about the serious matter of New Energy, New Physics, and Scientific Heresy in general...

Reprinted with permission from © Tribune Media Services, Inc. All Rights Reserved. Originally appeared in the *Chicago Tribune* April 4, 1989. Editor's Note: This cartoon refers to the Exxon Valdez oil spill in Alaska, which occurred—most ironically—less than twelve hours after the Fleischman/Pons cold fusion announcement on March 23, 1989.

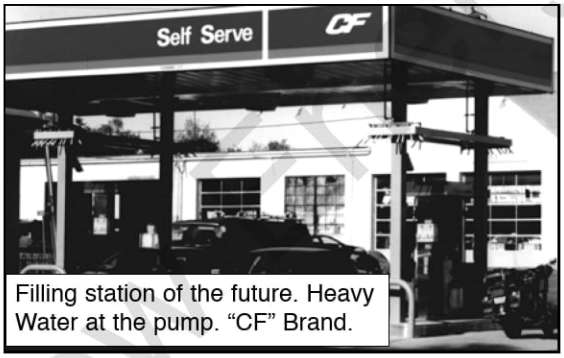
BAR STOOL SCIENCE NO 3 • CHARLES DARWIN BORED ON "THE BEAGLES" • BY SUSAN SEDDON

I'm sick of this darned boat - nearly five years I've been stuck on this insanitary barge, I've had enough! All I have to show for it is a dozen crates of dead finches and a bad dose of the Tierra del Fuegan trots. This ship's rum is only palatable after the third pint, and they aren't paying me a penny either!

It's so boring. . .can't even get a decent chess game. The Skipper's the only one worth challenging anyway, and he's always closeted in his cabin trying to invent the barometer. Why doesn't he invent something useful—like a games computer? Who needs a barometer? You only have to peer through the porthole to see that it's raining again!

I don't see why somebody couldn't make a machine that can play chess and think for itself; darned critters can adapt and evolve it's no big deal. The Skipper reckons my ideas on that score are fuzzy logic, but I prefer to call it case-based reasoning. He also says I'll get in big trouble back home when I publish my theories. Well, that'll be a while off, I'm a slow writer, perhaps he could invent a word processing machine too and speed things up a little.

Better go easy on the rum, I'm sure this bar stool keeps moving. Oh look, I'm not getting squiffy, I'm sitting on the giant tortoise that stowed away in Galapagos. Great stuff! "Oi, shipmates, where's the cards? I found out where our poker table strolled off to!" Next issue: Francis Bacon and Johannes Kepler start a bar brawl.



Filling station of the future. Heavy Water at the pump. "CF" Brand.

Send your humorous quotes or art to: Cold Fusion Technology, Managing Editor, P.O. Box 2816, Concord, NH 03302-2816

"I think the following quote applies only too well to a lot of mainstream academic writing these days":

"But though they wrote it all by rote
They did not write it right"

—Louisa Caroline, *The Vulture and the Husbandman*

Courtesy of Paul J. Brook, Wellington, New Zealand

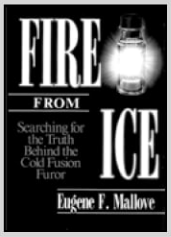
FIRE FROM ICE:

Searching for the Truth Behind the Cold Fusion Furor

By Eugene F. Mallove, Sc.D.

Published by John Wiley & Sons, Inc., 1991, 334 pp.
$25.95 No. America; $29.95 Other Foreign

A timeless treatment of the greatest scientific drama of our age. Nominated for a Pulitzer Prize in 1991.



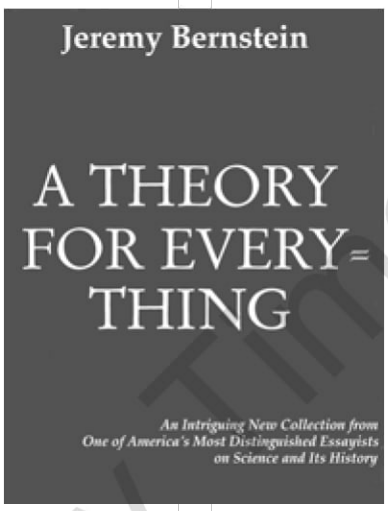
Cold Fusion Technology, P.O. Box 2816, Concord, NH 03302-2816;
Phone: 603-228-4516;
Fax: 603-224-5975;
e-mail: staff@infinite-energy.com

New Energy Times Archive

Words to Eat . . . by Eugene Mallove

Jeremy Bernstein, who studied physics at Harvard University, is a widely read science essayist. Fine examples of his writing can be found in his book, *A Theory for Everything* (the Copernicus imprint of Springer Verlag, New York, 1996). It is a collection of his work drawn from over ten years of writing for *The Atlantic*, *The New York Review of Books*, *The New Yorker*, and *Scientific American*. I have personally admired his writing. In fact, in 1984 I favorably reviewed his book, *Three Degrees Above Zero: Bell Labs in the Information Age*, for *The Washington Post*.

Sad to say, all is not well with Bernstein's more recent writings—at least in his misinformed musings about cold fusion. Certainly Bernstein is an erudite fellow, but apparently he is not immune to the same viral misconceptions about cold fusion that pervades the world of physicists with whom he hob-nobs. Bernstein never misses an opportunity to mention with which Big Name in physics he has shared thoughts and tea. He values their company, else what would he write about? It is surprising, therefore, that he has not taken seriously the theoretical work on cold fusion by his former teacher—Nobel laureate Julian Schwinger. He attributes the late Julian Schwinger's interest in cold fusion to a kind of mental lapse or malady to which he suggests older scientists may fall victim. (If there is such an age-related trait, perhaps Bernstein should look in the mirror.)



Bernstein has no basis for the ignorant barbs he has thrown at cold fusion. These are all the more unforgivable, since he has clearly *not* read the cold fusion literature. He has become a bigot purveying bigotry. He has the gall to stab his friend Arthur C. Clarke in the back, denigrating him as a cold fusion "True Believer." Clarke happens to know a lot more about evaluating frontier claims in science than does Bernstein. Bernstein should pay attention, but he does not. Apparently, Bernstein's method is to raise fingers to the sky to check the direction of favorable winds. That doesn't work. He thinks science moves forward by majority vote. Back to Harvard, Jeremy. Learn something about the history of scientific revolutions.

On the day that Bernstein tries to prove, by literature search or technical criticism of the peer-reviewed and non-peer-reviewed cold fusion literature, that there is "not a shred of evidence" for cold fusion, as he writes, we'll begin taking him seriously. For now, he is just another unfortunate purveyor of deception about one of the most important discoveries in the history of science.

Here are some of his egregious lapses:

From the chapter "Fused" in *A Theory for Everything*:—

"Within a month, the chemists [Fleischmann and Pons] had little to laugh about. Cold fusion, as far as most of the scientific community was concerned, was essentially dead. Indeed, the very simplicity of the Pons-Fleischmann setup, the fact that it was a table-top experiment, led to its rapid denouement."...

"It is fashionable now to point out what appears to be ethical lapses among scientists, as if such lapses were the norm. What this episode shows is just how exceptional such behavior is and how rapidly it can be exposed once the community focuses on it. It took some two months from the original press conference before most of the scientific community agreed that cold fusion was a fantasy.". . .

"Several years have passed since the press conference of Pons and Fleischmann. There still seem to be True Believers. As I note in another essay in this collection, my teacher Julian Schwinger was one. My very old friend Arthur C. Clarke, the science fiction writer is another. Every few months I receive a report from him.". . .

From his essay on Julian Schwinger:

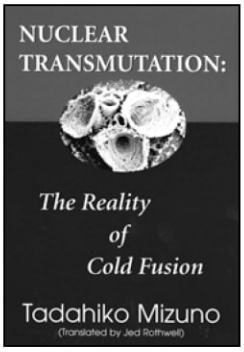
"The last news I had about Julian [Schwinger], before his unexpected death in July 1994, was that he had become interested in 'cold fusion.' Someone once gave me a reprint of a lecture Julian had given in Japan on the subject. I read it, but kept wondering why Julian had ever gotten into such an unfortunate subject."

Bernstein later notes, "..I still feel that in the days when people like Schwinger and Pauli were at the height of their powers, giants walked the Earth." To be sure! And it is equally true that while people such as Bernstein continue to purvey received ignorance about cold fusion, paradigm-paralyzed intellectual midgets are crawling in the gutters.

Here are some more gems, this from Jeremy Bernstein's review of E.O. Wilson's book *Consilience; The Unity of Knowledge*, the review titled, "E.O. Wilson's Theory of Everything," *Commentary*, June 1998. p. 62.

"Of many examples known to me, I will mention only two, Julian Schwinger, who died in 1994, was one of the greatest theoretical physicists of this century. Among other things, he developed quantum electrodynamics, the most accurate scientific theory ever devised—an accomplishment for which he shared the Nobel Prize in physics with Richard Feynman and Tomonaga

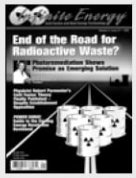
Bernstein continues on page 69



Purchase your copy of *Nuclear Transmutation: The Reality of Cold Fusion* Available Early December!

$32.95 North America,
$39.95 Other Foreign
(Includes First Class postage/Airmail shipping)
-*Hardcover*

Cold Fusion Technology, Inc.
P.O. Box 2816
Concord, NH 03302-2816
Phone: 603-228-4516
Fax: 603-224-5975
e-mail: staff@infinite-energy.com



Give a gift subscription of *Infinite Energy* to a school or library.

New Energy Times Archive

ZEN . . . AND THE ART OF DEBUNKERY
how to debunk just about everything

Revised edition, (C) 1997 by Daniel Drasin.

All rights reserved. May not be reproduced in any form without express permission from the author, ddrasin@aol.com This is a revised and expanded edition of an essay that has previously appeared in various publications between 1991 and 1997.

So you've had a close encounter with a UFO. Or a serious interest in the subject of extramundane life. Or a passion for following clues that seem to point toward the existence of a greater reality. Mention any of these things to most working scientists and be prepared for anything from patronizing skepticism to merciless ridicule. After all, science is supposed to be a purely hardnosed enterprise with little patience for "expanded" notions of reality. Right? Wrong.

Like all systems of truth seeking, science, properly conducted, has a profoundly expansive, liberating impulse at its core. This "Zen" in the heart of science is revealed when the practitioner sets aside arbitrary beliefs and cultural preconceptions, and approaches the nature of things with "beginner's mind." When this is done, reality can speak freshly and freely, and can be heard more clearly. Appropriate testing and objective validation can--indeed, *must*--come later.

Since the public tends to be unclear about the distinction between evidence and proof, do your best to help maintain this murkiness. If absolute proof is lacking, state categorically that "there is no evidence!"

Seeing with humility, curiosity and fresh eyes was once the main point of science. But today it is often a different story. As the scientific enterprise has been bent toward exploitation, institutionalization, hyperspecialization and new orthodoxy, it has increasingly preoccupied itself with disjointed facts in a psychological, social and ecological vacuum. So disconnected has official science become from the greater scheme of things, that it tends to deny or disregard entire domains of reality and to satisfy itself with reducing all of life and consciousness to a dead physics.

As we approach the end of the millennium, science seems in many ways to be treading the weary path of the religions it presumed to replace. Where free, dispassionate inquiry once reigned, emotions now run high in the defense of a fundamentalized "scientific truth." As anomalies mount up beneath a sea of denial, defenders of the Faith and the Kingdom cling with increasing self-righteousness to the hull of a sinking paradigm. Faced with provocative evidence of things undreamt of in their philosophy, many otherwise mature scientists revert to a kind of skeptical infantilism characterized by blind faith in the absoluteness of the familiar. Small wonder, then, that so many promising fields of inquiry remain shrouded in superstition, ignorance, denial, disinformation, taboo. . .and debunkery.

What is "debunkery?" Essentially it is the attempt to *debunk* (invalidate) new information and insight by substituting scient*istic* propaganda for the scient*ific* method.

To throw this kind of pseudoscientific behavior into bold--if somewhat comic--relief, I have composed a useful "how-to" guide for aspiring debunkers, with a special section devoted to debunking extraterrestrial intelligence—perhaps the most aggressively debunked subject in the whole of modern history. As will be obvious to the reader, I have carried a few of these debunking strategies over the threshold of absurdity for the sake of making a point. As for the rest, their inherently fallacious reasoning, twisted logic and sheer goofiness will sound frustratingly familar to those who have dared explore beneath the ocean of denial and attempted in good faith to report back about what they found there. So without further ado. . .

Part 1: General Debunkery

• Before commencing to debunk, prepare your equipment. Equipment needed: one armchair.

• Put on the right face. Cultivate a condescending air that suggests that your personal opinions are backed by the full faith and credit of God. Employ vague, subjective, dismissive terms such as "ridiculous" or "trivial" in a manner that suggests they have the full force of scientific authority.

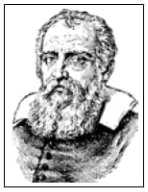
• Portray science not as an open-ended process of discovery but as a holy war against unruly hordes of quackery-worshipping infidels. Since in war the ends justify the means, you may fudge, stretch or violate the scientific method, or even omit it entirely, in the name of defending the scientific method.

• Keep your arguments as abstract and theoretical as possible. This will "send the message" that accepted theory overrides any actual evidence that might challenge it--and that therefore no such evidence is worth examining.

• Reinforce the popular misconception that certain subjects are inherently unscientific. In other words, deliberately confuse the *process* of science with the *content* of science. (Someone may, of course, object that since science is a universal approach to truth-seeking it must be neutral to subject matter; hence, only the investigative *process* can be scientifically responsible or irresponsible. If that happens, dismiss such objections using a method employed successfully by generations of politicians: simply reassure everyone that "there is no contradiction here!")

• Arrange to have your message echoed by persons of authority. The degree to which you can stretch the truth is directly proportional to the prestige of your mouthpiece.

• Always refer to unorthodox statements as "claims," which are "touted," and to your own assertions as "facts," which are "stated."



• Avoid examining the actual evidence. This allows you to say with impunity, "I have seen absolutely no evidence to support such ridiculous claims!" (Note that this technique has withstood the test of time, and dates back at least to the age of Galileo. By simply refusing to look through his telescope, the ecclesiastical authorities bought the Church over three centuries' worth of denial free and clear!)

New Energy Times Archive

• If examining the evidence becomes unavoidable, report back that "there is nothing new here!" If confronted by a watertight body of evidence that has survived the most rigorous tests, simply dismiss it as being "too pat."

• Equate the necessary skeptical component of science with *all* of science. Emphasize the narrow, stringent, rigorous and critical elements of science to the exclusion of intuition, inspiration, exploration and integration. If anyone objects, accuse them of viewing science in exclusively fuzzy, subjective or metaphysical terms.

• Insist that the progress of science depends on explaining the unknown in terms of the known. In other words, science equals reductionism. You can apply the reductionist approach in any situation by discarding more and more and more evidence until what little is left can finally be explained entirely in terms of established knowledge.

• Downplay the fact that free inquiry and legitimate disagreement are a normal part of science.

• Make yourself available to media producers who seek "balanced reporting" of unorthodox views. However, agree to participate in only those interviews whose time constraints and *a priori* bias preclude such luxuries as discussion, debate and cross-examination.

• At every opportunity reinforce the notion that what is familiar is necessarily rational. The unfamiliar is therefore irrational, and consequently inadmissible as evidence.

• State categorically that the unconventional may be dismissed as, at best, an honest misinterpretation of the conventional.

• Characterize your opponents as "uncritical believers." Summarily dismiss the notion that debunkery itself betrays uncritical belief, albeit in the status quo.

• Maintain that in investigations of unconventional phenomena, a single flaw invalidates the whole. In conventional contexts, however, you may sagely remind the world that, "after all, situations are complex and human beings are imperfect."

• "Occam's Razor," or the "principle of parsimony," says the correct explanation of a mystery will usually involve the simplest fundamental principles. Insist, therefore, that the most familiar explanation is by definition the simplest! Imply strongly that Occam's Razor is not merely a philosophical rule of thumb but an immutable law.

• Discourage any study of history that may reveal today's dogma as yesterday's heresy. Likewise, avoid discussing the many historical, philosophical and spiritual parallels between science and democracy.

• Since the public tends to be unclear about the distinction between evidence and proof, do your best to help maintain this murkiness. If absolute proof is lacking, state categorically that "there is no evidence!"

• If sufficient evidence has been presented to warrant further investigation of an unusual phenomenon, argue that "evidence alone proves nothing!" Ignore the fact that preliminary evidence is not supposed to prove *any*thing.

• In any case, imply that proof precedes evidence. This will eliminate the possibility of initiating any meaningful process of investigation--particularly if no criteria of proof have yet been established for the phenomenon in question.

• Insist that criteria of proof cannot possibly be established for phenomena that do not exist!

• Although science is not supposed to tolerate vague or double standards, always insist that unconventional phenomena must be judged by a separate, yet ill-defined, set of scientific rules. Do this by declaring that "extraordinary claims demand extraordinary evidence"-- but take care never to define where the "ordinary" ends and the "extraordinary" begins. This will allow you to manufacture an infinitely receding evidential horizon; (*i.e.*, to define "extraordinary" evidence as that which lies just out of reach at any point in time).

• In the same manner, insist on classes of evidence that are impossible to obtain. For example, declare that unidentified aerial phenomena may be considered real only if we can bring them into laboratories to strike them with hammers and analyze their physical properties. Disregard the accomplishments of the inferential sciences--astronomy, for example, which gets on just fine without bringing actual planets, stars, galaxies and black holes into its labs and striking them with hammers.

• Practice debunkery-by-association. Lump together all phenomena popularly deemed paranormal and suggest that their proponents and researchers speak with a single voice. In this way you can indiscriminately drag material across disciplinary lines or from one case to another to support your views as needed. For example, if a claim having some superficial similarity to the one at hand has been (or is popularly assumed to have been) exposed as fraudulent, cite it as if it were an appropriate example. Then put on a gloating smile, lean back in your armchair and just say, "I rest my case."

• Use the word "imagination" as an epithet that applies only to seeing what's *not* there, and not to denying what *is* there.

• If a significant number of people agree that they have observed something that violates the consensus reality, simply ascribe it to "mass hallucination." Avoid addressing the possibility that the consensus reality might itself constitute a mass hallucination.

• Ridicule, ridicule, ridicule. It is far and away the single most chillingly effective weapon in the war against discovery and innovation. Ridicule has the unique power to make people of virtually any persuasion go completely unconscious in a twinkling. It fails to sway only those few who are of sufficiently independent mind not to buy into the kind of emotional consensus that ridicule provides.

• By appropriate innuendo and example, imply that ridicule constitutes an essential feature of the scientific method that can raise the level of objectivity and dispassionateness with which any investigation is conducted.

• If pressed about your novel interpretations of the scientific method, declare that "intellectual integrity is a subtle issue."

• Imply that investigators of the unorthodox are zealots. Suggest that in order to investigate the existence of something one must first believe in it absolutely. Then demand that all such "true believers" know all the answers to their most puzzling questions in complete detail ahead of time. Convince people of your own sincerity by reassuring them that you yourself would "love to believe in these fantastic phenomena." Carefully sidestep the fact that science is not about believing or disbelieving, but about finding out.

• Use "smoke and mirrors," (*i.e.*, obfuscation and illusion). Never forget that a slippery mixture of fact, opinion, innuendo, out-of-context information and outright lies will fool most of the people most of the time. As little as one part fact to ten parts B.S. will usually do the trick. (Some veteran debunkers use homeopathic dilutions of fact with remarkable success!) Cultivate the art of slipping back and forth between fact and fiction so undetectably that the flimsiest foundation of truth will always appear to firmly support your entire edifice of opinion.

• Employ "TCP": Technically Correct Pseudo-refutation. Example: if someone remarks that all great truths began as blasphemies, respond immediately that not all blasphemies have become great truths. Because your response was technically correct, no one will notice that it did not really refute the origi-

New Energy Times Archive

nal remark.

• Trivialize the case by trivializing the entire field in question. Characterize the study of orthodox phenomena as deep and time-consuming, while deeming that of unorthodox phenomena so insubstantial as to demand nothing more than a scan of the tabloids. If pressed on this, simply say, "But there's nothing there to study!" Characterize any serious investigator of the unorthodox as a "buff" or "freak," or as "self-styled"--the media's favorite code-word for "bogus."

• Remember that most people do not have sufficient time or expertise for careful discrimination, and tend to accept or reject the whole of an unfamiliar situation. So discredit the whole story by attempting to discredit *part* of the story. Here's how: a) take one element of a case completely out of context; b) find something prosaic that hypothetically could explain it; c) declare that, therefore, that one element has been explained; d) call a press conference and announce to the world that the entire case has been explained!

• Engage the services of a professional stage magician who can mimic the phenomenon in question; (*i.e.*, ESP, psychokinesis or levitation.) This will convince the public that the original claimants or witnesses to such phenomena must themselves have been (or been fooled by) talented stage magicians who hoaxed the original phenomenon in precisely the same way.

• Find a prosaic phenomenon that, to the uninitiated, resembles the claimed phenomenon. Then suggest that the existence of the commonplace look-alike somehow forbids the existence of the genuine article. For example, imply that since people often see "faces" in rocks and clouds, the enigmatic Face on Mars must be a similar illusion and therefore cannot possibly be artificial.

• When an unexplained phenomenon demonstrates evidence of intelligence (as in the case of the mysterious crop circles) focus exclusively on the mechanism that might have been wielded by the intelligence rather than the intelligence that might have wielded the mechanism. The more attention you devote to the mechanism, the more easily you can distract people from considering the possibility of non-ordinary intelligence.

• Accuse investigators of unusual phenomena of believing in "invisible forces and extrasensory realities." If they should point out that the physical sciences have *always* dealt with invisible forces and extrasensory realities (gravity? electromagnetism? . . .) respond with a condescending chuckle that this is "a naive interpretation of the facts."

• Insist that western science is completely objective, and is based on no untestable assumptions, covert beliefs or ideological interests. If an unfamiliar or inexplicable phenomenon happens to be considered true and/or useful by a nonwestern or other traditional society, you may dismiss it out of hand as "ignorant misconception," "medieval superstition" or "fairy lore."

• Label any poorly-understood phenomenon "occult," "fringe," "paranormal," "metaphysical," "mystical," "supernatural," or "new-age." This will get most mainstream scientists off the case immediately on purely emotional grounds. If you're lucky, this may delay any responsible investigation of such phenomena by decades or even centuries!

• Ask questions that appear to contain generally-assumed knowledge that supports your views; for example, "Why do no police officers, military pilots, air traffic controllers or psychiatrists report UFOs?" (If someone points out that they do, insist that those who do must be mentally unstable.)

• Ask unanswerable questions based on arbitrary criteria of proof. For example, "If this claim were true, why haven't we seen it on TV?" or "in this or that scientific journal?" Never forget the mother of all such questions: "If UFOs are extraterrestrial, why haven't they landed on the White House lawn?"

• Similarly, reinforce the popular fiction that our scientific knowledge is complete and finished. Do this by asserting that "if such-and-such were true, we would already know about it!"

• Remember that you can easily appear to refute anyone's claims by building "straw men" to demolish. One way to do this is to misquote them while preserving that convincing grain of truth;—for example, by acting as if they have intended the extreme of any position they've taken. Another effective strategy with a long history of success is simply to misreplicate their experiments—or to avoid replicating them at all on grounds that "to do so would be ridiculous or fruitless." To make the whole process even easier, respond not to their actual claims but to their claims as reported by the media, or as propagated in popular myth.

• Insist that such-and-such unorthodox claim is not scientifically testable because no self-respecting grantmaking organization would fund such ridiculous tests.

• Be selective. For example, if an unorthodox healing practice has failed to reverse a case of terminal illness you may deem it worthless--while taking care to avoid mentioning any of the shortcomings of conventional medicine.

• Hold claimants responsible for the production values and editorial policies of any media or press that reports their claim. If an unusual or inexplicable event is reported in a sensationalized manner, hold this as proof that the event itself must have been without substance or worth.

• When a witness or claimant states something in a manner that is scientifically imperfect, treat this as if it were not scientific at all. If the claimant is not a credentialed scientist, argue that his or her perceptions cannot possibly be objective.

• If you're unable to attack the facts of the case, attack the participants--or the journalists who reported the case. *Ad-hominem* arguments, or personality attacks, are among the most powerful ways of swaying the public and avoiding the issue. For example, if investigators of the unorthodox have profited financially from activities connected with their research, accuse them of "profiting financially from activities connected with their research!" If their research, publishing, speaking tours and so forth constitute their normal line of work or sole means of support, hold that fact as "conclusive proof that income is being realized from such activities!" If they have labored to achieve public recognition for their work, you may safely characterize them as "publicity seekers."

• Fabricate supportive expertise as needed by quoting the opinions of those in fields popularly assumed to include the necessary knowledge. Astronomers, for example, may be trotted out as experts on the UFO question, although course credits in ufology have never been a prerequisite for a degree in astronomy.

• Fabricate confessions. If a phenomenon stubbornly refuses to go away, set up a couple of colorful old geezers to claim they

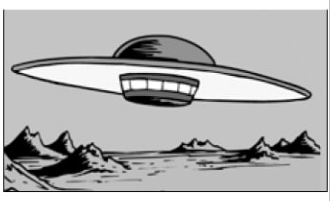
New Energy Times Archive

hoaxed it. The press and the public will always tend to view confessions as sincerely motivated, and will promptly abandon their critical faculties. After all, nobody wants to appear to lack compassion for self-confessed sinners.

• Fabricate sources of disinformation. Claim that you've "found the person who started the rumor that such a phenomenon exists!"

• Fabricate entire research projects. Declare that "these claims have been thoroughly discredited by the top experts in the field!" Do this whether or not such experts have ever actually studied the claims, or, for that matter, even exist.

Part 2: Debunking Extraterrestrial Intelligence



• Point out that an "unidentified" flying object is just that, and cannot be automatically assumed to be extraterrestrial. Do this whether or not anyone involved *has* assumed it to be extraterrestrial.

• Equate nature's laws with our current understanding of nature's laws. Then label all concepts such as antigravity or interdimensional mobility as mere flights of fancy "because what present-day science cannot explain cannot possibly exist." Then if an anomalous craft is reported to have hovered silently, made right-angle turns at supersonic speeds or appeared and disappeared instantly, you may summarily dismiss the report.

• Declare that there is no proof that life can exist in outer space. Since most people still behave as if the Earth were the center of the universe, you may safely ignore the fact that Earth, which is already in outer space, has abundant life.

• Point out that the official SETI program assumes in advance that extraterrestrial intelligence can only exist light-years away from Earth. Equate this *a-priori* assumption with conclusive proof; then insist that this invalidates all terrestrial reports of ET contact.

• If compelling evidence is presented for a UFO crash or some similar event, provide thousands of pages of detailed information about a formerly secret military project that might conceivably account for it. The more voluminous the information, the less need to demonstrate any actual connection between the reported event and the military project.

• When someone produces purported physical evidence of alien technology, point out that no analysis can prove that its origin was extraterrestrial; after all, it might be the product of some perfectly ordinary, ultra-secret underground government lab. The only exception would be evidence obtained from a landing on the White House lawn—the sole circumstance universally agreed upon by generations of skeptics as conclusively certifying extraterrestrial origin!

• If photographs or other visual media depicting anomalous aerial phenomena have been presented, argue that since images can now be digitally manipulated they prove nothing. Assert this regardless of the vintage of the material or the circumstances of its acquisition. Insist that the better the quality of a UFO photo, the greater the likelihood of fraud. Photos that have passed every known test may therefore be held to be the most perfectly fraudulent of all!

• Argue that all reports of humanoid extraterrestrials must be bogus because the evolution of the humanoid form on Earth is the result of an infinite number of accidents in a genetically isolated environment. Avoid addressing the logical proposition that if interstellar visitations have occurred, Earth cannot be considered genetically isolated in the first place.

• Argue that extraterrestrials would or wouldn't, should or shouldn't, can or can't behave in certain ways because such behavior would or wouldn't be logical. Base your notions of logic on how terrestrials would or wouldn't behave. Since terrestrials behave in all kinds of ways you can theorize whatever kind of behavior suits your arguments.

• Stereotype contact claims according to simplistic scenarios already well-established in the collective imagination. If a reported ET contact appears to have had no negative consequences, sarcastically accuse the claimant of believing devoutly that "benevolent ETs have come to magically save us from destroying ourselves!" If someone claims to have been traumatized by an alien contact, brush it aside as "a classic case of hysteria." If contactees stress the essential humanness and limitations of certain ETs they claim to have met, ask, "Why haven't these omnipotent beings offered to solve all our problems for us?"

• When reluctant encounter witnesses step forward, accuse them indiscriminately of "seeking the limelight" with their outlandish stories.

• Ask why alleged contactees and abductees haven't received alien infections. Reject as "preposterous" all medical evidence suggesting that such may in fact have occurred. Categorize as "pure science-fiction" the notion that alien understandings of immunology might be in advance of our own, or that sufficiently alien microorganisms might be limited in their ability to interact with our biological systems. Above all, dismiss anything that might result in an actual investigation of the matter.

• Travel to China. Upon your return, report that "nobody there told me they had seen any UFOs." Insist that this proves that no UFOs are reported outside countries whose populations are overexposed to science fiction.

• Where hypnotic regression has yielded consistent contactee testimony in widespread and completely independent cases, argue that hypnosis is probably unreliable, and is always worthless in the hands of non-credentialed practitioners. Be sure to add that the subjects must have been steeped in the ET-contact literature, and that, whatever their credentials, the hypnotists involved must have been asking leading questions.

• If someone claims to have been emotionally impacted by a contact experience, point out that strong emotions can alter perceptions. Therefore, the claimant's recollections must be entirely untrustworthy.

• Maintain that there cannot possibly be a government cover-up of the ET question . . . but that it exists for legitimate reasons of national security!

• Accuse conspiracy theorists of being conspiracy theorists and of believing in conspiracies! Insist that only *accidentalist* theories can possibly account for repeated, organized patterns of suppression, denial and disinformational activity.

• In the event of a worst-case scenario--for example, one in which extraterrestrial intelligence is suddenly acknowledged as a global mystery of millennial proportions--just remember that the public has a short memory. Simply hail this as a "victory for the scientific method" and say dismissively, "Well, everyone knows this is a monumentally significant issue. As a matter of fact, my colleagues and I have been remarking on it for years!"

About the Author:

Daniel Drasin is a writer, media producer and award-winning cinematographer. He lives in the San Francisco Bay Area and is the Director of Production at New Dimensions Radio and the principal photographic consultant to the Society for Planetary SETI Research.

Editor's Note: Although this article pertains to the debunking of "ET" evidence and the like, its message is directly applicable to cold fusion and new energy. We thank Daniel Drasin for permission to reprint it. Gene Mallove.

New Energy Times Archive

Tinsley continued from page 7

took such exception to Chris's new theories on the mathematics of the gyroscope that he tore up his treatise and refused to discuss it or explain his actions at all.

This was his first encounter with the narrow-mindedness of Academe and the intolerance it sadly continues to demonstrate towards innovative thinking. He kept no copy of those papers, much to the chagrin of my mathematician friend, who is convinced that Chris must have discovered something quite astounding which scared the hell out of his Professor.

His mathematical skills were sorely tested in our extremely competitive games of "Dutch Car." This highly complex challenge consists of being the first to spot a car with an "NL" sticker (the plates are also quite distinctive, being bright yellow front and rear and comprising three sets of double digits, or letters). It is necessary to be first to yell "Dutch Car" in order to score a point.

Chris outside Caernarfon Castle, N.Wales standing in the middle of TWO Dutch cars and looking extremely smug.

The complexity lies in the rules, which I devised and were naturally, therefore, in a constant state of flux and invariably stacked heavily in my favor.

Rule 1 was that there could be no more than 150 rule changes. At the last count, I was up to Rule Change No. 149(Ω)MCMLXIII, sub-rule 37(d) which was "If no one can recall the current score, just pick any number as your score and assume that I'm three points ahead of it."

The irritating thing is that, before he left us, he was actually one point ahead of me. Typical!

I just hope he realizes that this warrants yet another Rule Change.

Bernstein continued from page 64

Shin'ichiro in 1965. He was also my teacher (both undergraduate and graduate) at Harvard, and there was no scientist for whom I had greater respect. I was, therefore, appalled when, a few years before his death, Schwinger became an enthusiast for cold fusion. There was and is not a shred of evidence that this idea has any scientific merit, but it attracted an odd group of eccentrics and hustlers who welcomed Schwinger like a god descended from Mount Olympus—a hero. What is worse, I have no reason to think that Schwinger was insincere in his enthusiasm."

Of course he was sincere! Schwinger quit the American Physical Society to protest its censorship of cold fusion science.

From another recent Bernstein lapse: ("Science on Trial"—a book review.)

"I do not know if the experimenters—Stanley Pons and Martin Fleischmann—two electrochemists from the University of Utah—who claimed to have observed what became known as cold fusion had any conscious intention to deceive—which would have been fraud—or, as seems overwhelmingly likely, they simply made a mistake from which they would not back down. . . Thus, by the end of April [1989], several groups announced that they had not been able to reproduce—using instrumentation that was more sensitive than the ones that Pons and Fleischmann had used—the same data. Indeed, that data did not itself appear to be internally consistent. As far as most observers were concerned, the idea was dead. There are still some True Believers and at least two hundred million dollars was spent over the next few years trying to revive it, but it took only about a month to cast sufficient doubt on the original experiment so that there was basically no further interest in the subject.". . ."That is why I think forgery in science is so rare. As far as reputations are concerned, it doesn't pay. . .

Fear not, dear readers. There is poetic justice in this matter of Jeremy Bernstein's cold fusion problem. I predict: A) He will continue in denial and will become even more outrageous in his denunciations—more grist for our mill; B) He will eventually suffer severe psychological trauma as he tries in vain to reconcile his past pronouncements with what he will be forced to accept; and C. (Best of all—his punishment.) Bernstein will have missed the immense joy of participating in the real excitement of one of the greatest scientific revolutions in history.

It will be fascinating to read the cover-up story that Bernstein will eventually have to concoct to explain away his bad behavior. We could be wrong. Bernstein might execute an immediate 180-degree maneuver if he were to begin cracking the books and the journals. Don't count on it. He has too much momentum. He's headed for a crash.

Device testing continued from page 18

4. According to the paper, the cell is calibrated with heater input. However, during electrolysis heat is carried off by the evolving hydrogen gas, so I have doubts about the validity of this calibration method.

Based on the differences listed above, in my judgment Marett is not measuring under the same conditions we do. I would not expect to see excess heat evolution in his experiment. If he could contact me directly I would be happy to discuss the experiment in greater detail. #End#

Further adding to the mix of results, we received a highly positive paper from Dr. Phyllip Kanarev in Russia, in which he runs the electrolyte continuously through an active cell that appears to be like Ohmori-Mizuno, but which uses a cathode of molybdenum and an anode of titanium. He gets consistent excess power results (see report, translated by Dr. Peter Glück on page 31. COP's of 1.42 and 1.82 were measured. The report is endorsed by a committee of the faculty of Kuban State University.

MIRACLE IN THE VOID

"Dr. O'Leary bluntly states that we can replace the current oil-based economy, renovate our nation-states and clean up the environment. ***Miracle in the Void*** is good reading for everyone who wants beneficial changes on the planet."
Jeanne Manning, Author, *The Coming Energy Revolution*

A Stimulating Book by Physicist and Former Apollo Astronaut

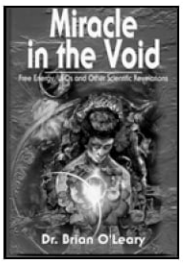
$24.95 North America, $29.95 Foreign

(Includes First Class Postage/Airmail Shipping)

Cold Fusion Technology, Inc.

P.O. Box 2816,Concord, NH 03302-2816

Phone: 603-228-4516; Fax: 603-224-5975



New Energy Times Archive

Classifieds

FREE Gift if you visit OURPAL website
http://www.Sourceindia.com/ourpal/

OUR PAL(R) ASIJA
MBA, PE, CDP, JD, ATM
AFFORDABLE
Intellectual Property
Attorney

PH:203-924-9538, FAX:203-924-9956
E-Mail: Ourpal@CompuServe.com
Jail-Mail: 203-924-4271
(AKA Voice-Mail)
Snail-Mail: 7 Woonsocket Avenue
Shelton, CT 06484
Free Inventrepreneurship Kit

SUPPRESSED-INCREDIBLE INVENTIONS

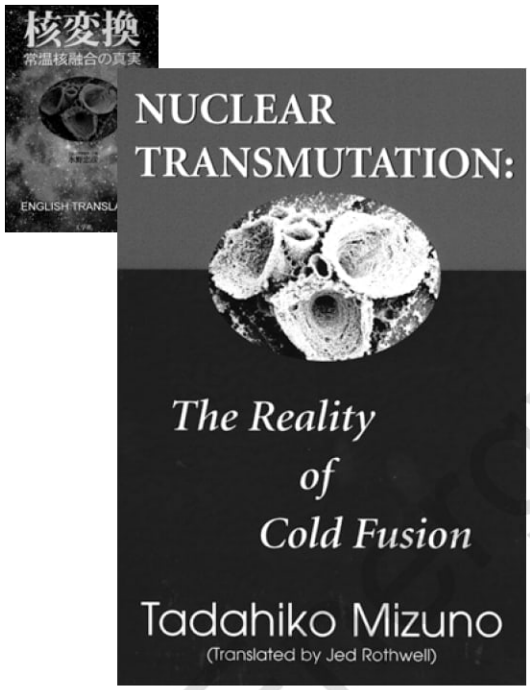
$15. Exotic Books catalog (Stamps)
153 Village Circle
Garden Valley, ID 83622

If you've been thinking about placing a classifed ad – why not

Place your classified ad for three months and receive an extra month **FREE!** We have over 3000 readers and are distributed in 37 countries.

$.50 per word

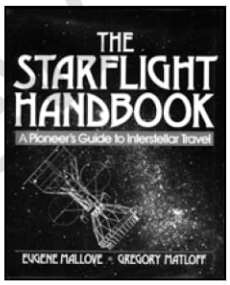
Cold Fusion Technology, Inc.
P.O. Box 2816, Concord, NH 03302
Phone: 603-228-4516



The English translation of *Nuclear Transmutation: The Reality of Cold Fusion* will be available in early December! Order from:

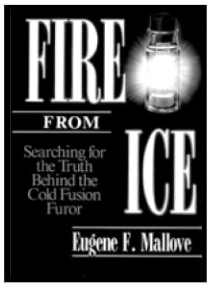
Infinite Energy Press
Cold Fusion Technology, Inc.
P.O. Box 2816
Concord, NH 03302-2816
Phone: 603-228-4516; Fax: 603-224-5975
E-mail: staff@infinite-energy.com

Books written and inscribed by Dr. Eugene Mallove - order soon while supply lasts!



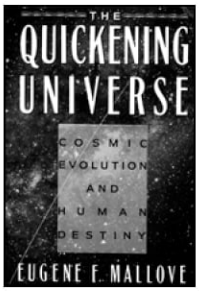
1989

ONLY $32.95 (North America)
$41.95 (Foreign)



1991

Only $25.95 (North America)
$29.95 (Foreign)



1987

Only $19.95 (North America)
$24.95 (Foreign)

Books sent First Class or Airmail. Order from Cold Fusion Technology - see address above.

New Energy Times Archive

HIGHLIGHTS FROM INFINITE ENERGY ™ MAGAZINE

(The following listing is not comprehensive. There is much more in each issue!)

Volume 1—1995-1996

Issue No. 1 (52 pages)

• "Cold Fusion: A Brief History of Mine" (Nobel Laureate Julian Schwinger) • "Welcome to the Apocalypse?" (Arthur C. Clarke) • Very Hot Cold Fusion: Ceramic Proton Conductors from Japan • Preview of Monte Carlo, Fifth International Conference on Cold Fusion • Table-Top Alchemy: Roger Stringham's Ultrasonic Cold Fusion Creates Helium-4 and Helium-3 and Lots of Excess Heat • Testing the Patterson Power Cell • Water Cavitation Reactor (Michael Huffman) • Japan TV Features "Over-Unity" Magnetic Motors

Issue No. 2 (56 pages)

• COLD FUSION Goes Commercial—Dr. James Patterson and Jim Reding of Clean Energy Technologies, Inc. (CETI) Aim to Help Clean Up the World • ICCF-5—Fifth International Conference on Cold Fusion • Alchemy Nightmare: Skeptic Finds Heavy Element Transmutation in Cold Fusion Experiment • Magnetic Resonance Amplifier • Major Oil Company Reveals Secret Positive Cold Fusion Experiment of 1989 • Moldova Water Fuel Device • The MIT Cold Fusion Patent (#5,411,654) • Experimenter's Corner: Nuclear Effects from Self-heated Wire? •Unitary Quantum Mechanics (Lev Sapogin)

Issue No. 3 (60 pages)

• Low Energy Transmutation Conference in Texas • Testing Excess Heat Cavitation Devices (Worldwide Reports) • Cold Fusion Companies and Products • High-School Student's Cold Fusion Experiments • Applying the Nucleon Cluster Model to Experimental Results • Table-top Sonoluminescence • How to Miss the Energy Boat • A Brief History of a Book • Mechanisms of a Disobedient Science

Issue No. 4 (60 pages)

• Pons and Fleischmann Patent to Issue in Europe • Mizuno's Solid-State High Temperature Cold Fusion • 80-to-1 Cold Fusion Demo at Hot Fusion Meeting • Atomic Bomb Physicist (Dr. Joseph McKibben) Proposes Startling Cold Fusion Theory • The Piantelli Cold Fusion Patent • ICCF5 Talk by Los Alamos's Dr. Edmund Storms • Kawai Magnetic Motor (US Patent #5,436,518) • Acoustic Levitation • The New Scientific Age (Dr. Brian O'Leary) • Cold Fusion Documentary, "Too Close to the Sun" on BBC and Canadian TV

Special Double Issue No. 5 & 6 (120 pages)

• CETI's 1-kilowatt Cold Fusion Demo • *Infinite Energy's* 1996 Cold Fusion Symposium, Cambridge, MA • Patterson Power Cell on ABC-TV Good Morning America and Nightline • Latest Patterson Patent • Takahashi's Super Magnets • MasterPrinciple of EM Over-Unity (Tom Bearden) • HydroCatalysis Power Corporation • Chinese and Russian Cold Fusion Conferences • Transmutations in Palladium (Bockris and Minevski) • The Nucleon Cluster Model (and *color* periodic table) • The Energy Active State in Pd-D (Ed Storms) • Griggs HydroSonic Pump • Newman's Energy Machine • **COLD FUSION RESOURCE GUIDE —1996** (Frequently Asked Questions; Cold Fusion, What it Does; Basic Information Resources; Seminal Articles: Experimental Evidence; Highlights of Cold Fusion History: A Timeline)

Volume 2—1996-1997

Issue No. 7 (72 pages)

• The Correa Pulsed Abnormal Glow Discharge Reactor•Japan Research Yields Transmutations in Metals • International Symposium on New Energy-III • Los Alamos Lab's Cold Tritium Generator Goes Public • NASA Confirms Excess Energy • Cold Fusion and New Energy—An Environmentalist's Perspective • The Energy Machine of Joe Newman (book review and other reports)

Issue No. 8 (64 pages)

•Overview of the Correa Invention (Mike Carrell) • The Reality of Perpetual Motion (Dr. Harold Aspden) • A "Chain Reaction" of New Energy Movies (*Chain Reaction* Debuts) • Properties of Palladium and the PF Effect (Ed Storms) • Interviews: Dr. John Bockris and Dr. Hal Puthoff • SuperTube (Moray King)

Issue No. 9 (72 pages)

• Prof. George Miley, *Fusion Technology* Editor, Confirms Low Energy Transmutations in Patterson Cell • "SuperPower, Inc." Investment Fund • Cold Alchemy: Landmark Low Energy Transmutation Conference in Texas • AquaFuel -Wonder Fuel of the New Energy Age • The Wright Brothers and Cold Fusion (Jed Rothwell) • "Anti-Gravity" Experiments Go Public • Mass Modification Experiment Definition Study (Dr. Robert L. Forward)

Issue No. 10 (72 pages)

• CETI's Table-Top Research Nuclear Reactor, Rent for only $3,750/Year • ICCF6 in Japan — Sixth International Conference on Cold Fusion • Transmutation in Biology? • Experimenter's Corner: Iron from Carbon, Oxygen, and Hydrogen? • "Over-Unity" in Carbon Arc Nuclear Reactions • Adams Aspden Motor Patent •Triode Cold Fusion Cell (Evan Ragland) • Open Letter to Japan's NHE Cold Fusion Lab Directorate •Breakthrough in Thermoelectrics

Issue No. 11 (80 pages)

• An Interview with Dr. Martin Fleischmann (Chris Tinsley) • *The Saint* Cold Fusion Movie • Vacuum Energy Patent Issued • Zero Point Energy Confirmed at Los Alamos • More AquaFuel Testing • Review of EPRI -SRI International Cold Fusion Report • Coping with the US Patent Office on Cold Fusion • BlackLight Power Corp • Experimental Evidence for Nucleon Cluster Model • Adams-Aspden Motor Patent

Issue No. 12 (72 pages)

• BlackLight Power Corp. and Randell Mills • Arthur C. Clarke on Cold Fusion • Cold Fusion and the Future • Cold Fusion Cell Makes DOE Critic Blink • Arata and Zhang: Massive Helium/ Heat Production in Cold Fusion • Protonic Conduct-ors and Cold Fusion — A Russian Perspective • Charge Clusters in Operation (Hal Fox) • *Wizard* Tesla Biography (Jeff Kooistra) • Energy Gain in Low Energy p and D Nuclear Reactions • Palladium, Platinum, Gold Futures • Drs. Patterson and Cravens Receive Cold Fusion Patent • CETI/ ENECO Patent Dispute in Europe

Volume 3—1997-1998

Double Issue No. 13/ 14 (128 pages)

•Remediation of Nuclear Waste—Demo Transmutation Units go on Sale! •New Energy Investment Fund Launched • Cold Fusion and the Future (Part II) • Tesla Symposium •Extrac-ting Intermolecular Bond Energy from Water • Carl Sagan and Cold Fusion •Science Writers and Cold Fusion •Paul Brown and Nuclear Battery •

(Issue 13/ 14 continued)

Continuing Research into T.H. Moray • Black-Light Power Financial News • Neutrino Power? • Adams Thermo-Motor Generator

Special Double Issue No. 15/ 16 (128 pages)

• Dr. Melvin Miles' *et al.* US Navy Report Nails Down Evidence for Cold Fusion • Radioactivity Reduction Patent Issued to CETI • NASA Breakthrough Propulsion Physics Conference • Historical Reports on Claims of Low-Energy Transmutation • UV Excimer Laser Production of New Elements on Cold Fusion Metals • What Nobel Laureate Glenn Seaborg Told President Bush about Cold Fusion only Three Weeks after the Utah Announcement • "Gold Fusion"—The Economics of Alchemy • Dr. Hal Puthoff: "Can the Vacuum be Engineered for Spaceflight?"

Issue No. 17 (96 pages)

• Cold Fusion and Transmutation Conference in Italy—Three Reports • Interview with Dr. Randell Mills of BlackLight Power, Inc. • Full Text of Mills Patent, Granted in Australia • Marinov Motor Proved to Violate Standard EM Theory—Repeatable, Simple Experiments, Proposed Theory by Dr. Thomas Phipps, Jr. • More on the PAGD™ Reactor Excess Electrical Energy Phenomenon • Three New Reports of Early 20th Century Low-Energy Transmutation—Papers in Mainstream Science Journals! • New Book from Japan on Cold Fusion and Transmutation Bares All • Cincinnati Group Transmutation—More Evidence Emerges • Larry Niven "Tabletop Fusion"

Issue No. 18 (88 pages)

• Nuclear Augmented Combustion Emerges • Review of Arata-Zhang's Cold Fusion: Helium and Excess Heat • US Army Report on Biological Transmutation • New Feature: "Words to Eat"—Silly Sayings of the Cold Fusion Skeptics • Enter "Miracle #2": Electrochemical Activation Method for Cheap, Rapid Water Sterilization • Testing of Adams-Aspden Motors • The President and the "HeavyWatergate" Scandal • More on the History of Modern Alchemy • Ken Shoulders' EV Technology Reviewed • The Marinov Motor is not a Homopolar Generator • Cold Fusion Pioneer Kevin Wolf Obit.

Volume 4—1998-1999

Issue No. 19 (88 pages)

• Kinetic Furnace, High Over-Unity Cavitation Commercial Device • Dr. Les. Case's Catalytic Fusion Process • Report on the 7th Intl. Conference on Cold Fusion • Marinov Motor Applications and Experiments • Aspden's Cold Fusion-related Patent • Analog Editor Blasts Status Quo • APS's Robert Park's "Words to Eat"

Issue No. 20 (88 pages)

•Do-It-Yourself CF Experiment/Ohmori-Mizuno •American Nuclear Soc. Ann. Mtg.• ICCF-7 Coverage • Arthur Clarke Speaks Out on Cold Fusion • Society for Scientific Exploration Mtg. • Yull Brown's Death • George Miley's Review of Mizuno Book • Rhodium-Catalyzed Fusion in Palladium • Theory of Excess Energy in a PAGD Reactor • Detection of Anomalous Elements (Mitsubishi) • Cold Fusion Meeting in Italy • Former Exxon Employee Joins CETI

Issue No. 21 (72 pages)

Photoremediation Shows Promise as Emerging Solution to Radioactive Waste • New Section: Device and Process Testing Updates • Cold Fusion Revisited (Dr. Edmund Storms) • Cold Fusion Theory by Prof. Robert Parmenter • Critique of Parmenter Paper (Robert Bass) • Why Free Energy is Mathematically and Physically Possible (Patrick Cornille) • Bessler's Wheel - Reviews of *Perpetual Motion* • Review of *Power Surge* (Jed Rothwell) • Hans Coler's Free Energy Generators

NPS Energy Archive

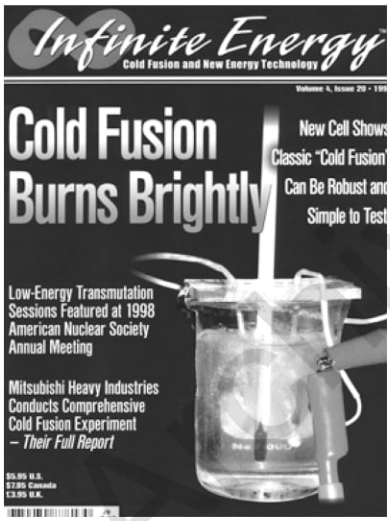
SUBSCRIBE TO THE LEADING PUBLICATION

Infinite Energy

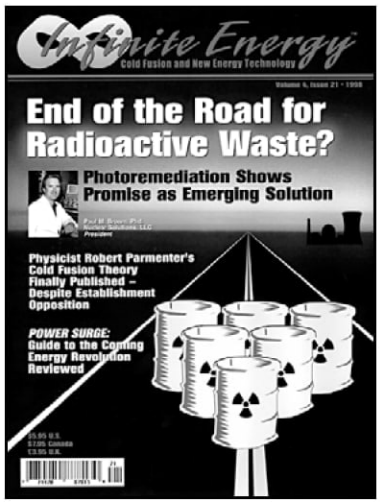
Cold Fusion and New Energy Technology

(Visit our website: http://www.infinite-energy.com)

Eugene F. Mallove, Sc.D., Editor-in-Chief



Now in our Fourth year, *Infinite Energy* magazine premiered with the March/April 1995 issue, which was distributed to the participants of the Fifth International Conference on Cold Fusion (ICCF-5), held in Monte Carlo Monaco (April 1995). The May/June 1995 issue was sent to many hundreds of current subscribers, journalists, and libraries. We now have over 3000 readers in over three-dozen countries. The magazine has expanding distribution on select U.S. newsstands and is expected to increase greatly now that commercial applications are emerging. *IE* is presently subscription-driven through ads in international magazines. Typical 1997/1998 press run: 5,000 copies/issue.



Infinite Energy is an international technical magazine with outreach to the general public as well. It is written at the technical level of *Scientific American* or *Science News*—except for some highly technical papers which are original contributions. To maintain the highest editorial standards, it is written and edited by scientists, engineers, and expert journalists. It is aimed at pioneering scientists, engineers, industrialists, and investors who are entering an exciting new R&D area. This area continues to grow explosively, with significant involvement by corporations and institutions in the U.S., Japan, France, Italy, India, Russia, and China. New technology developments and scientific discoveries are being made monthly and reported in the peer-reviewed scientific literature. ***Infinite Energy*** reports on the latest information that is now pouring in from research centers around the globe.

SUBSCRIBE OR RENEW TODAY!

The highly affordable subscription price of this bi-monthly magazine of general and technical interest is only $29.95 for residents **of North America**. (To cover air mail for other countries, the annual foreign subscription price is $49.95). Annual subscription price includes six issues per year.

Cold Fusion Technology, Inc.
P.O. Box 2816
Concord, NH 03302-2816

Fax: 603-224-5975
Phone: 603-228-4516
website: http://www.infinite-energy.com

Subscribe to or Renew *Infinite Energy*. Any six single back issues, $29.95 in North America, $49.95 for other foreign.

Issues currently available: 1, 2, 3, 4, 5/ 6,* 7, 8, 9, 10, 11, 12, 13/14,* 15/16,* 17, 18, 19, 20, 21, 22
***Double issue**

New ____ **Renew**____

Name:_____ **Start at issue no.** _____ **(see above)**
Address:_____
Address:_____
City:_____ State:_____ Postal Code/Zip:_____
Country:_____ Phone:_____ Fax:_____
If using Credit Card: Check one: Master Card ____ VISA____American Express____
Card Number: _____ Expiration Date: _____
Signature_____ **Optional:** E-Mail address_____

(ISSN 1081-6372)

New Energy Times Archive